RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.

PUBLISHED EVERY FRIDAY BY THE RAILROAD GAZETTE AT 83 FULTON STREET, NEW YORK
BRANCH OFFICES AT 375 OLD COLONY BUILDING CHICAGO, AND QUEEN ANNE'S CHAMBERS WESTMINSTER, LONDON

EDITORIAL ANNOUNCEMENTS.

THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It contains selected reading pages from the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

OFFICERS.—In accordance with the law of the state of New York, the following announcement is made of the office of publication, at 83 Fulton St., New York, N.Y., and the names of the officers and editors of The Railroad Gazette:

OFFICERS:

W. H. BOARDMAN, *Prest. and Editor.*
E. A. SIMMONS, *Vice-President.*
RAY MORRIS, *Secretary*
R. S. CHISOLM, *Treas.*
I. B. RINES, *Cashier*
L. B. SHERMAN, *Western Manager*

EDITORS:

RAY MORRIS, *Man'g Editor*
BRAMAN B. ADAMS
CHARLES H. FRY
RODNEY HITT
GEORGE L. FOWLER
FRANK W. KRAEGER
HUGH RANKIN
BRADFORD BOARDMAN

CONTENTS

VOL. XLIII., No. 25. FRIDAY, DECEMBER 20, 1907.

The rumors piled on rumors, combined with admissions of President Mellen that two large railroad interests have been seeking the New Haven's holdings in the Boston & Maine, allow a good deal to be read between the printed lines. One of the interests referred to undoubtedly is the Canadian Pacific, which touches the Boston & Maine at several points, the other the Delaware & Hudson, which reaches the Boston & Maine at Troy, N. Y. Transfer to either corporation would shift the Boston & Maine to a foreign control not directly hit by Massachusetts politics; and, by an exchange of the Boston & Maine stock for new shares of the Delaware & Hudson the New Haven could acquire an interest which, in alliance with others in the D. & H., might still control the Boston & Maine after receiving its price. A sale to the Canadian Pacific, on the other hand, would only have the protection of traffic contracts and, spite of such international analogies as the Grand Trunk and Great Northern, would be viewed with federal disfavor. Sale to any interest, however, is very unlikely and remote. Not lightly, even for a great price, will the New Haven split the monopoly of New England so carefully built up, so strategic in its relations with connecting railroad systems, and just beginning to demonstrate its powers. It will be surrendered only in extremity and under the spur of legislative acts akin to persecution. Meanwhile the outside offers supply the New Haven with the metaphorical "big stick" which, raised in menace of a sale, keeps the Massachusetts politician at bay.

We learn as we go to press that the case against A. H. Smith, Vice-President and General Manager of the New York Central & Hudson River, whose trial for manslaughter began December 10, in New York, has been dismissed by Judge Kellogg, following the summing up of the prosecution. Criminal negligence was alleged, and the district attorney endeavored to show that the Williamsbridge derailment was due to the inexperience of the motorman in charge of the double-headed electric train; that he exceeded safe speed on the curve, and that the general manager of the road was responsible for the selection of the motorman, and for not prescribing adequate rules for safety. But it should be noted that there have been several opinions on the moving cause of the derailment, each backed with sufficient plausibility so that a jury might be expected to disagree if asked to decide categorically whether or not the derailment was caused by the incompetence of the motorman. Even if definite proof of this point had been brought forward, it is difficult for a layman to see how a criminal charge would lie against a general manager who had selected a division superintendent with care and impartiality from a number of highly-trained candidates, and had detailed to that division superintendent the power to make minor appointments either directly or through an assistant superintendent—especially when all parties concerned were continuously engaged in the performance of their regular duties as they best understood them. The case appears quite different from that of a steamer captain who is absent from the bridge or pilot house at a time when special danger is to be anticipated, as in a narrow channel, or during a fog. In such a contingency the captain is able actually to use his training and ability in directing the helmsman, while the railroad manager can by no possibility actually supervise the routine work performed by all his subordinates. It seems entirely right, since this is the case, that a general manager should be held strictly to accountability in the selection of these subordinates, and if it can be shown that he has made the best selections in his power, and then supervised their work in accordance with the best standards of supervision, we cannot see that justice can require more. If a manager lacks capacity or initiative to do these things, it ought not to take long for his president to find it out and to supersede him. But criminal law is singularly ill adapted as an instrument with which to reform bad railroad practice; the suspension of a sea captain's license is a better kind of remedy, because it reflects on the captain's efficiency rather than on his integrity. The nearest approach to license suspension in the railroad business is the kind of supervision by the highest officers of the road that makes every lesser officer and employee realize that somebody knows what he is doing, whether good or ill, and that his career is going to be determined accordingly.

RAIL SPECIFICATIONS.

The Proceedings of the October meeting of the American Railway Association have just been issued, containing the report of the Committee on Standard Rail and Wheel Sections. This report consists of a majority report on rail sections and on specifications for Bessemer steel rails, and a minority report by Mr. Kruttschnitt on specifications for Bessemer steel rails. Several members of the committee also dissent from certain clauses in the majority report relating to rail section, discard and chemical composition.

The subject of rail sections was discussed in the *Railroad Gazette*, Nov. 22, and the proposed new sections were also presented. In order that the reader may be fully advised as to the latest developments in the important matter of rail specifications, we reprint

below in full the majority report on specifications, following the same with extracts from other specifications, covering all points of difference.

The committee prefaces its report by an introductory statement, from which we quote such parts only as have an important bearing on specifications:

Chemical Composition.—In the matter of chemistry specification for Bessemer rails, there was a strong desire on the part of the railroad members to specify a lower phosphorus content than has been generally accepted in recent years; but the testimony of the manufacturers was to the effect that the available supply of low-phosphorus ores would make it impossible to manufacture more than a small percentage of the total rail requirements of the country to a maximum phosphorus limit less than 0.10, and the manufacturers, on this account, unanimously object to the incorporation in the Bessemer rail specifications of anything suggesting the adoption of .085 phosphorus.

Discard.—In the matter of discard, there was a desire on the part of the railroad members to arrange for a greater discard, and a strong disposition to insist upon a uniform minimum percentage. The manufacturers, however, presented considerable evidence which tended to show that a fixed minimum percentage requirement would be not only unfair but unscientific, claiming that the extent of piping and segregation is influenced by the size of the ingot, the rate of pouring into the mold, and other details of mill practice.

The committee desires further time to investigate these matters, and in the meantime arrangements have been made for comparative tests in service of a large number of rails rolled under each of the suggested specifications, so that more definite knowledge may be had of the effect on the actual life of the rail.

SPECIFICATION FOR BESSEMER STEEL RAILS.

Process of Manufacture.

1. (*a*) The entire process of manufacture and testing shall be in accordance with the best current state of the art, and special care shall be taken to conform to the following instructions:

(*b*) Ingots shall be kept in a vertical position in the pit heating furnaces until ready to be rolled, or until the metal in the interior has time to solidify.

(*c*) Bled ingots shall not be used.

(*d*) There shall be sheared from the end of the bloom formed from the top of the ingot sufficient discard to ensure sound rails, and if after the first cut the steel is not solid, the shearing shall continue until it is.*

Chemical Composition for Rails Designed According to Cardinal Principles.

2. Rails of the various weights per yard specified below shall conform to the following limits in chemical composition:†

(*a*) For Bessemer Steel with Maximum Phos., 0.085.

	80 lbs.	90 lbs.	100 lbs.	110 lbs.	120 lbs.
Carbon	0.50 to 0.60	0.53 to 0.63	0.55 to 0.65	0.55 to 0.65	0.55 to 0.65
Manganese	0.80 to 1.10	0.84 to 1.14	0.86 to 1.16	0.88 to 1.18	0.90 to 1.20
Phosphorus, not to exceed	0.085	0.085	0.085	0.085	0.085
Silicon, not to exceed	0.20	0.20	0.20	0.20	0.20
Sulphur, not to exceed	0.075	0.075	0.075	0.075	0.075

(*b*) For Bessemer Steel with Maximum Phos., 0.10.

	80 lbs.	90 lbs.	100 lbs.	110 lbs.	120 lbs.
Carbon	0.43 to 0.53	0.45 to 0.55	0.46 to 0.56	0.48 to 0.58	0.50 to 0.60
Manganese	0.80 to 1.10	0.84 to 1.14	0.86 to 1.16	0.88 to 1.18	0.90 to 1.20
Phosphorus, not to exceed	0.10	0.10	0.10	0.10	0.10
Silicon, not to exceed	0.20	0.20	0.20	0.20	0.20
Sulphur not to exceed	0.075	0.075	0.075	0.075	0.075

3. The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass the temperature of the rail will not exceed that which requires a shrinkage allowance at the hot saws, for a 33-ft. rail of 100-lb. section, of 6¼ in. and 1/16 in. above or below for each 5-lb. increase or decrease of section. No artificial means of cooling the steel shall be used after the rails leave the rolls, nor shall they be held before sawing for the purpose of reducing their temperature.

4. *Drop Test.*—One drop test shall be made on a piece of rail rolled from the top of the ingot and be not less than 4 ft. and not more than 6 ft. long, selected from each blow of steel. The rails shall be placed head upward on the supports and the various sections shall be subjected to the following impact tests under a free falling weight:

80-lb. rail	20 ft.
90-lb. rail	21 ft.
100-lb. rail	22 ft.
110-lb. rail	24 ft.
120-lb. rail	25 ft.

If any rail breaks when subjected to the drop test, two additional tests may be made of other rails from the same blow of steel, also taken from the top of the ingots, and if either of these latter rails fail, all the rails of the blow which they represent will be rejected, but if both of these additional test pieces meet the requirements, all the rails of the blow which they represent will be accepted.

The drop-testing machine shall have a tup of 2,000-lb. weight, the striking face of which shall have a radius of not more than 5 in. and the test rail shall be placed head upward on solid supports 3 ft. apart. The anvil block shall weigh at least 20,000 lbs., and the supports shall be part of, or firmly secured to, the anvil. The report of the drop test shall state the atmospheric temperature at the time the test was made. The testing shall proceed concurrently with operation of the mill.

5. *Section.*—The section of rail shall conform, as accurately as possible, to the templet furnished by the railroad company, consistent with the paragraph relative to specified weight. A variation in height of 1/64 in. less, or 1/32 in. greater than the specified height, and 1/16 in. in width will be permitted. The section of rail shall conform to the finishing dimensions.

6. *Weight.*—The weight of the rails shall be maintained as nearly as possible, after complying with the preceding paragraph, to that specified in contract. A variation of ½ of 1 per cent. for an entire order will be allowed. Rails will be accepted and paid for according to actual weights.

7. *Length.*—The standard length of rails shall be 33 ft. Ten per cent. of the entire order will be accepted in shorter lengths, varying as follows: 30 ft., 28 ft., 26 ft., 24 ft., and all No. 1 rails less than 33 ft. long shall be painted green on the ends. A variation of ¼ in. in length from that specified will be allowed.

8. *Drilling.*—The holes for splice bars shall be drilled circular and in accordance with the specifications of the purchaser. The holes shall conform accurately to the drawing and dimensions furnished, in every respect, and must be free from burrs.

9. *Straightening.*—Care must be taken in hot straightening the rails, and it must result in their being left in such condition that they shall not vary throughout their entire length more than 4 in. from a straight line in any direction when delivered to the cold straightening presses. Those which vary beyond that amount or have short kinks shall be classed as second quality rails and be so stamped. The distance between supports of rails in the gagging press shall not be less than 42 in. Rails shall be straight in line and surface when finished—the straightening being done while cold—smooth on head, sawed square at ends, variations to be not more than 1/32 in., and, prior to shipment, shall have the burr occasioned by the saw cutting removed and the ends made clean. No. 1 rails shall be free from injurious defects and flaws of all kinds. Rails whilst on the cooling beds shall be protected from coming in contact with water or snow.

10. *No. 2 Rails.*—A No. 2 rail is a first quality rail with some imperfections, and shall be accepted up to 5 per cent. of the entire order. They shall not have flaws in their heads of more than ¼ in., or in the flange of more than ½ in. in depth, and, in the judgment of the inspector, these shall not be so numerous or of such a character as to render them unfit for recognized second quality rail uses. The ends of No. 2 rails shall be painted white and shall have two prick-punch marks on the side of the web near the heat number brand, and placed so as not to be covered by the splice bars. Rails from heats which failed under the drop test shall not be accepted as No. 2 rails.

11. *Branding.*—The name of the maker, the weight of the rail, and the month and year of manufacture shall be rolled in raised letters on the side of the web, and the number of the blow shall be plainly stamped on each rail where it will not subsequently be covered by the splice bars. Where practicable, a figure or letter shall be stamped on the web to indicate the portion of the ingot from which the rail was rolled.

12. *Inspection.*—(*a*). The inspector representing the purchaser shall have free entry to the works of the manufacturer at all times when the contract is being filled, and shall have all reasonable facilities afforded him by the manufacturer to satisfy him that the finished material is furnished in accordance with the terms of these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment and so conducted as not to unnecessarily interfere with the operation of the mill. On request of the inspector, the manufacturer shall furnish drillings for check analysis.

(*b*) The manufacturer shall furnish the inspector daily with carbon determinations for each blow and a complete chemical analysis every 24 hours representing the average of the other elements contained in the steel for each day and night turn. These analyses shall be made on drillings taken from small test ingots. The drillings for analyses shall be taken from the ladle test at a distance of ¼ in. beneath the surface.

Note.—In view of the necessity of rails being ordered and furnished at once, before the new sections embodying the cardinal principles are designed, the sub-committee recommends that the specification herewith recommended be used, modified as to the following clauses:

2 (*b*).

	Wt. per yd. 75-lb.—80-lb.	Wt. per yd. 85-lb.—90-lb.	Wt. per yd. 100-lb.
Carbon	0.40 to 0.50	0.43 to 0.53	0.45 to 0.55
Manganese	0.75 to 1.05	0.80 to 1.10	0.84 to 1.14
Phosphorus, not to exceed	0.10	0.10	0.10
Silicon, not to exceed	0.20	0.20	0.20
Sulphur, not to exceed	0.075	0.075	0.075

3. The amount of shrinkage shall be fixed at 6¾ in. at the hot saws for a 33-ft. 100-lb. rail, with a decrease of 1/16 in. for each 5-lb. decrease in weight of section.

4. Height of drop:

75-lb. per yd.	17 ft.
80-lb. "	18 ft.
85-lb. "	18 ft.
90-lb. "	19 ft.
100-lb. "	19 ft.

9. The maximum amount of camber to be 5 in.

In order that the above specifications, recommended by a majority of the committee, may be conveniently compared with those embodied in the minority report and the specifications of other leading engineering associations, we give below extracts covering all points of difference.

The various specifications will be referred to by the letters (a), (b), (c) and (d). The side numerals refer to parts designated by like numerals in the majority report. For convenience of comparison we have further italicised all matter at variance with the majority report.

(a) American Railway Association—Minority Report.

(b) American Society of Civil Engineers—Specifications recommended for Bessemer Steel Rails.

(c) American Railway Engineering and Maintenance of Way Association—Specifications for Bessemer Steel Rails.

(d) American Society for Testing Materials—Standard Specifications for Steel Rails.

*Mr. John D. Isaacs and Mr. Joseph T. Richards favor "a discard of 20 per cent., with a further stipulation that should this discard not provide a sound ingot, additional cropping must be done until such ingot results."

†Mr. John D. Isaacs does not favor specifying a phosphorus content exceeding 0.085.

1. (*a*) *With the present temperatures and speeds used in pouring ingots there shall be sheared from the top of ingots approximately* 17 x 19 *in. in cross-section not less than twenty* (20) *per cent., and if from any cause the* steel does not then appear to be solid, the shearing shall continue until it does. *If by reduction of temperatures and speed of pouring or the use of any improvements in the process of making ingots, the defect known as piping shall be prevented, the above shearing requirements may be modified by the purchaser.*

(*b*) and (*c*). There shall be sheared from the end of the blooms formed from the top of the ingots *not less than* 25 *per cent.*, and if, from any cause, the steel does not then appear to be solid, the shearing shall continue until it does. *If, by the use of any improvements in the process of making ingots, the defect known as piping shall be prevented, the above shearing requirements may be modified.*

(*d*) There shall be sheared from the end of the blooms formed from the top of the ingots *not less than — per cent,*‡ and if, from any cause, the steel does not then appear to be solid, the shearing shall continue until it does.

2. (*a*) For Bessemer steel with maximum phosphorous 0.085.

	80 lbs.	90 lbs.	100 lbs.
Carbon	0.50 to 0.60	0.53 to 0.63	0.55 to 0.65
Manganese	0.80 to 1.10	0.84 to 1.14	0.86 to 1.16
Phosphorus, not to exceed	0.085	0.085	0.085
Silicon, not to exceed	0.20	0.20	0.20
Sulphur, not to exceed	0.075	0.075	0.075

Does not consider 110-lb. and 120-lb rails.

(*b*)	70 to 79-lb. Percentage.	80 to 89-lb. Percentage.	90 to 100-lb. Percentage.
Carbon	0.50 to 0.60	0.53 to 0.63	0.55 to 0.65
Phosphorus shall not exceed	0.085	0.085	0.085
Silicon shall not exceed	0.20	0.20	0.20
Sulphur shall not exceed	0.075	0.075	0.075
Manganese	0.75 to 1.00	0.80 to 1.05	0.80 to 1.05

Does not consider 110-lb. and 120-lb. rails.

(*c*)	70 to 79-lb. Percentage.	80 to 89-lb. Percentage.	90 to 100-lb. Percentage.
*Carbon	0.50 to 0.60	0.53 to 0.63	0.55 to 0.65
Phosphorus shall not exceed	0.085	0.085	0.085
Silicon shall not exceed	0.20	0.20	0.20
Sulphur shall not exceed	0.075	0.075	0.075
Manganese	0.75 to 1.00	0.80 to 1.05	0.80 to 1.05

**Carbon may be reduced to suit local conditions.*

Does not consider 110-lb. and 120-lb. rails.

(*d*) Does not consider maximum phosphorus 0.085.

Does not consider 110-lb. and 120-lb. rails.

(*a*) Does not consider maximum phosphorus 0.10.

(*b*) Does not consider maximum phosphorus 0.10.

(*c*) Does not consider maximum phosphorus 0.10.

(*d*)	50 *to* 59-*lb.* *Percentage.*	60 *to* 69-*lb.* *Percentage.*	70 *to* 79-*lb.* *Percentage.*	80 to 89-lb. Percentage.	90 to 100-lb. Percentage.
Carbon	0.35 to 0.45	0.38 to 0.48	0.40 to 0.50	0.43 to 0.53	0.45 to 0.55
Phosphorus shall not exceed	0.10	0.10	0.10	0.10	0.10
Silicon shall not exceed	0.20	0.20	0.20	0.20	0.20
*Manganese	0.70 to 1.00	0.70 to 1.00	0.75 to 1.05	0.80 to 1.10	0.80 to 1.10

**Manganese content, 90 to 100-lb. rails, also differs from majority report.*

Considers 50-lb. to 80-lb. rails, but not 110-lb. and 120-lb. rails.

3. (*a*) Same as majority report.

(*b*) and (*c*) The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass, the temperature of the rail will not exceed that which requires a shrinkage allowance at the hot saws, for a 33-ft. rail of 100-lb. section, *of* $6^{7}/_{16}$ *in., and* $^{1}/_{16}$ *in.* less for each 5-lb. decrease of section. *These allowances to be decreased at the rate of* $^{1}/_{90}$ *in. for each second of time elapsed between the rail leaving the finishing rolls and being sawn.* No artificial means of cooling the steel shall be used after the rails leave the rolls, nor shall they be held before sawing for the purpose of reducing their temperature.

(*d*) The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass the temperature of the rail will not exceed that which requires a shrinkage allowance at the hot saws, for a 33-ft. rail of 100-lb. section, *of* $7^{5}/_{16}$ *in.*, and $^{1}/_{10}$ in. less for each 5-lb. decrease of section. *These allowances to be decreased at the rate of .01 in. for each second of time elapsed between the rail leaving the finishing rolls and being sawn.* No artificial means of cooling the rails shall be used between the finishing pass and the hot saws.

Omits: "Nor shall they be held before sawing for the purpose of reducing their temperature."

4. (*a*) Does not cover 110-lb. and 120-lb. rails.

(*b*) and (*c*) *Drop Test.*—One drop test shall be made on a piece of rail, not less than 4 ft. and not more than 6 ft. long, selected from each blow of steel. The test piece shall be taken from the top of the ingot. The rails shall be placed head upward on the supports, and the various sections shall be subjected to the following impact tests under a free falling weight:

70 to 79-lb. rails	18 *ft.*
80 to 89-lb. rails	20 *ft.*
90 to 100-lb. rails	22 *ft.*

Does not cover 110-lb. and 120-lb. rails.

(*d*) One drop test shall be made on a piece of rail not less than 4 ft. and not more than 6 ft. long, selected from every fifth blow of steel. The test shall be taken from the top of the ingot. The rail shall be placed head upward on the supports, and the various sections shall be subjected to the following impact tests under a free falling weight:

	Weight of rail, Pounds per yard.				*Height of drop.*
	45	*to and including*		55	15 *ft.*
More than	55	"	"	65	16 *ft.*
More than	65	"	"	75	17 *ft.*
More than	75	"	"	85	18 *ft.*
More than	85	"	"	100	19 *ft.*

Does not cover 110-lb. and 120-lb. rails.

‡*The percentage of minimum discard in any case to be subject to agreement, and it should be recognized that the higher this percentage the greater will be the cost.*

(*b*), (*c*) and (*d*). Do not state:

"The testing shall proceed concurrently with operation of mill."

5. (*c*) *Unless otherwise specified, the section of rail shall be the American Standard, recommended by the American Society of Civil Engineers,* and shall conform, as accurately as possible, to the templet furnished by the railroad company, consistent with paragraph No. 8, relative to specified weight. A variation in height of one sixty-fourth ($^{1}/_{64}$) inch less, or one thirty-second ($^{1}/_{32}$) inch greater than the specified height, and one-sixteenth ($^{1}/_{16}$) inch in width, will be permitted. The section of rail shall conform *perfectly* to the finishing dimension.

(*d*) *Unless otherwise specified, the section of rail shall be the American Standard, recommended by the American Society of Civil Engineers,* and shall conform, as accurately as possible, to the templet furnished by the railroad company, consistent with Paragraph No. 8, relative to specified weight. A variation in height of $^{1}/_{64}$ in. less, or $^{1}/_{32}$ in. greater than the specified height, and $^{1}/_{16}$ in. in width will be permitted.

Omits: "The section of rail shall conform to the finishing dimensions."

7. (*b*), (*c*) and (*d*) "*Length.*—The standard length of rails shall be 33 ft. Ten per cent. of the entire order will be accepted in shorter lengths varying *by even feet to* 27 *ft.*, and all No. 1 rails less than 33 ft. long shall be painted green on the ends. A variation of ¼ in. in length from that specified will be allowed.

(*b*) "*Straightening.*—Care must be taken in hot-straightening the rails, and it must result in their being left in such condition that they shall not vary throughout their entire length more than 5 *in.* from a straight line in any direction, when delivered to the cold-straightening presses. Those which vary beyond that amount, or have short kinks, shall be classed as second-class rails and be so stamped.

"Rails shall be straight in line and surface when finished—the straightening being done while cold—smooth on head, sawed square at ends, variation to be not more than $^{1}/_{32}$ in., and, prior to shipment shall have the burr occasioned by the saw cutting removed and the ends made clean. No. 1 rails shall be free from injurious defects and flaws of all kinds.

Omits: Distance between supports in gagging press.

(*c*) Rails shall be straight in line and surface when finished—the straightening being done while cold—smooth on head, sawed square at ends, variation to be not more than $^{1}/_{32}$ in., and, prior to shipment shall have the burr occasioned by the saw cutting removed and the ends made clean. No. 1 rails shall be free from injurious defects and flaws of all kinds.

Care must be taken in hot-straightening the rails, and it must result in their being left in such a condition that they shall not vary throughout their entire length of 33 ft. more than 3 *in.* from a straight line in any direction, when delivered to the cold-straightening presses. Those which vary beyond that amount, or have short kinks, shall be classed as second quality rails and be so stamped. The distance between supports of rails in the gagging press shall not be less than 42 in.

(*d*) Care must be taken in hot-straightening the rails, and it must result in their being left in such a condition that they shall not vary throughout their entire length more than 5 in. from a straight line in any direction when delivered to the cold-straightening presses. Those which vary beyond that amount, or have short kinks, shall be classed as second quality rails and be so stamped. The distance between supports of rails in the gagging press shall not be less than 42 in. Rails shall be straight in line and surface when finished—the straightening being done while cold—smooth on head, sawed square at ends, variations to be not more than $^{1}/_{32}$ in., and, prior to shipment, shall have the burr occasioned by the saw cutting removed, and the ends made clean. No. 1 rails shall be free from injurious defects and flaws of all kinds.

(*b*), (*c*) and (*d*) *Omit*: "Rails whilst on the cooling beds shall be protected from coming in contact with water or snow."

10. (*c*) No. 2 rails will be accepted up to to five (5) per cent. of the whole order. *Rails that possess any injurious defects, or which for any other cause are not suitable for first quality, or No. 1 rails, shall be considered as No. 2 rails; provided, however, that rails which contain any physical defects which impair their strength shall be rejected.* The ends of all No. 2 rails shall be painted white in order to distinguish them. Rails rejected under the drop test will not be accepted as No. 2 rails.

(*d*) No. 2 rails will be accepted up to 10 per cent. of the whole order. *Rails which possess any injurious defects, or which for any other cause are not suitable for first quality, or No. 1 rails, shall be considered as No. 2 rails; provided, however, that rails which contain any physical defects which impair their strength shall be rejected.* The ends of all No. 2 rails shall be painted white in order to distinguish them.

Omits: Rails rejected under the drop test not acceptable.

12. (*b*) Does not specify:

"The drillings for analyses shall be taken from the ladle test at a distance of ¼ in. beneath the surface."

(*c*) and (*d*) Do not specify:

(1) On request of the inspector, the manufacturer shall furnish drillings for check analysis.

(2) The drillings for analyses shall be taken from the ladle test at at distance of ¼ in. beneath the surface.

In an editorial appearing in the *Railroad Gazette*, Sept. 6, we printed in parallel columns the specifications (b), (c) and (d), following the same with a discussion of their principal features. The subject of rail specifications was also discussed editorially Oct. 18 and Nov. 15. We shall now summarize the situation in the light of the report of the committee of the American Railway Association. Before doing so, however, we shall quote in full the introductory statement of the minority report prepared by Mr. Kruttschnitt, in which he endeavors to present the position both of the railroads and the manufacturers on the principal points at issue.

TO THE MEMBERS OF THE AMERICAN RAILWAY ASSOCIATION:

I respectfully present my views on rails, with sections and specifications as a minority report of the Committee on Standard Rail and Wheel Sections.

Rail breakages, which lately have been increasing at an alarming rate, seem to be due to three principal causes:

1. *Improper Chemical Composition,* due either to improper specifications or to segregation.

2. *Insufficient Discard,* causing concealed defects, which result in breaks in service, sometimes with, but frequently without warning.

3. *Too Great Haste in Manufacture of Rails,* which are finished at too high temperatures, due partly to faulty distribution of material in cross-sections and partly to improper manipulation or work on the head in the rolls.

Improper Chemical Composition.

The position of the manufacturers and the railroads is summed up as follows:

The Manufacturers Claim:

(*a*) Insufficient ore supply for phosphorus below 0.10.

(*b*) Safe rails can be made with 0.10 phosphorus.

Railroads Claim:

(*a*) Admitting that ore supply to make rails with phosphorus below 0.10 is limited, yet as the United States mills make rails for export with phosphorus below 0.10, and Canadian mills using ores imported from the United States are making rails with 0.085 phosphorus for Canadian roads, it is not unreasonable for the railroads of the United States to want all 0.085 rails that can be made, and unless specifications call for them they will never get any. Foreigners should not be favored with the highest grade of rail produced in our mills.

(*b*) Not denied that safe rails can be made with 0.10 phosphorus, but as carbon has to be reduced 7.5 points for the increase of 1.5 points in phosphorus, the resultant rail is softer, deficient in wearing qualities, and not nearly so desirable and efficient as one with less phosphorus and more carbon.

It is not expected that with the recommended specifications all of the Bessemer rail made in the United States can be furnished with a phosphorus content as low as 0.085, but as this committee is expected to recommend specifications that will give the best rail obtainable, we are convinced that prescribing a phosphorus content that shall not exceed 0.085 will result in securing for domestic lines the highest grade of product, leaving the lower for export. Under the specifications of 0.10 phosphorus heretofore forced on the railroads by the manufacturers, the reverse has been the case. The committee should not lend itself to a perpetuation of this condition. Prescribing 0.085 phosphorus does not condemn a rail, with higher phosphorus content, but it operates as a constant caution to the purchaser against raising phosphorus and lowering carbon, thereby getting a less desirable and efficient rail.

Insufficient Discard.

A sub-committee, as well as the entire committee, has devoted a great deal of time in the past year and a half conferring with manufacturers trying to obtain promises for safer and better rails. The position of the railroads and manufacturers is outlined as follows:

The Manufacturers Claim:

(*a*) That many breaks are improperly attributed to piping, and all except one claim that no fixed percentage of discard will insure sound rails.

(*b*) That the increased number of broken rails is caused by greater speeds and wheel loads.

The Railroads Claim:

(*a*) That this may be a question of nomenclature, but the fact is the breaks do occur more frequently than formerly, especially in the heavier sections. * * * * * Segregation and piping take place in the top of the ingot, and whilst impossible to locate them definitely so that we may be certain in discarding a particular fraction of the ingot that we have done away with all danger from their presence, it seems to be conceded beyond reasonable doubt that as we increase the discard we eliminate more and more of the trouble; just what the per cent. should be is doubtful, but it may be inferred from the following evidence:

1. The president of one of the largest steel works in the United States states that the depth to which piping extends in a 17 x 19 ingot (and this is the size of ingot most commonly used in rolling mills) is about 18 per cent. of the depth of the ingot.

2. The same works are selling premium carbon rails, which they claim are of the highest grade they are able to make on specifications of their own, which prescribe 20 per cent. discard.

3. The recommended specifications of the American Society of Civil Engineers prescribe 25 per cent. discard.

4. The recommended specifications of the American Railway Engineers and Maintenance of Way Association prescribe 25 per cent. discard.

5. The head of an eminent firm of inspecting engineers, which does the inspecting for many large systems of railroads, recommends 25 per cent.

6. One of the largest railroad systems in the United States, which seems to have been singularly and suggestively exempt from rail breakages, has been prescribing and obtaining a discard of 25 per cent. A Canadian mill whose output has been singularly free from breakages used a discard of 16 per cent.

7. Mr. H. M. Howe in an article on "How May Quality of Steel Rails Be Improved," in the *Engineering and Mining Journal,* says: "The richest of the segregate lies near the top of the ingot, usually in the upper 20 per cent."

(*b*) The alarming increase in breakages is not due to increase of speeds and loads, but to poorer quality, due to careless manufacture. Rails of 70, 60 and even 50 lbs. per yd. are to-day safely carrying the same loads at the same speeds under which 80, 90 and 100-lb. rails are breaking in large numbers.

The proposal of the manufacturers that the percentage of discard should be left open to agreement with the purchaser in each case, recognizing at the same time the principle that the higher the discard the greater the price, would leave matters just as they stand and would perpetuate conditions that have caused the increased breakages and the feelings of alarm and insecurity shared by the railroad managers and the public. We think it is the duty of the committee to make some recommendation based on the best evidence obtainable, to serve as a guide to the purchaser, who should understand that whilst it seems impossible to fix a percentage that will guarantee the absence of internal flaws, it seems nevertheless reasonably certain from the evidence before us that the present practice of discarding 10 per cent., as the manufacturers claim to be doing, is insufficient, and that an increase to about 20 per cent. on ingots of the size most commonly used would practically eliminate breaks from piping and segregation and give a safe rail.

Too Great Haste in the Manufacture of Rails.

The Manufacturers Claim:

(*a*) Faulty distribution of metal in sections, forcing them to stop rolling the head when the base has cooled, and whilst the head is still hot enough to be worked.

(*b*) No greater speed of rolls than formerly used.

The Railroads Claim:

(*a*) The present sections of A. S. C. E. were approved by the rail makers. They admit reasonableness of manufacturers' claim, and concede that a change of sections is desirable.

(*b*) Whilst speed of rolls may be no greater, the number of passes has been reduced, and the manipulation of work done on the metal has been cut down so that closeness of texture or fineness of grain, on which wear depends, has been correspondingly reduced and sacrificed.

Your committee has been convinced by the manufacturers that a change in the sections whereby the metal would be more equally distributed between the base and the head, thereby allowing rolling to be done at a lower temperature, would be beneficial.

Two sets of sections[1] are submitted herewith and recommended for adoption, our preference being strongly for those marked A, in designing which great weight was given to the consideration of the rail as a girder and its function to distribute a load over a number of supports. To do this efficiently it must be stiff, that is, deep. These A sections have high moments of inertia, and for the same weights are much stiffer, admit of very much stiffer splice bars, and will, therefore, make smoother riding track than the sections marked B.

Respectfully submitted,

J. Kruttschnitt.

The specifications embodied in the minority report are substantially the same as those recommended by the committee of the American Society of Civil Engineers and those adopted by the American Railway Engineering and Maintenance of Way Association, except that the percentage of discard is reduced from 25 to 20 per cent.

The specifications contained in the majority report follow more closely the lines of those of the American Society for Testing Materials, so far as present rail sections and the use of steel with a phosphorus content not exceeding 0.10 per cent. are concerned. They make provision also, however, for revised sections with increased heights of drop, and for steel with a phosphorus content not exceeding 0.085 per cent.

In the matter of discard these specifications are disappointing, in that they stipulate "sufficient discard to insure sound rails," as against fixed minimum percentages in specifications (a), (b) and (c), and a blank percentage, subject to agreement, in the Specifications of the American Society for Testing Materials. It is true that the American Railway Association has not adopted these specifications, and that they have been referred back to the committee with instructions to make further investigation.[2] The proper percentage of discard may in time be determined by an extensive series of tests, but pending the results of such tests, it is to be regretted that the more conservative policy of specifying a definite minimum percentage of discard was not recommended.

It is pertinent in this connection to quote from the report of the committee of the American Society of Civil Engineers, presented some two years ago, a statement made in connection with the discussion of the question of discard: "* * * it is well known that one of the frequent causes of failure of steel rails is due to piping. and that this comes from unsound ingots. Unfortunately, such failures often cause accidents, which result in large material damage, and, what is worse, the loss of life. Frequently such interior defects cannot be detected until after the rails have been subjected to traffic, hence it is of the greatest importance that care should be exercised in the manufacture with a view of reducing the danger to a minimum."

Since the usual mill practice involves a discard of from 7 to 10 per cent., it would have been more satisfactory if the committee had specified at least a moderate increase, say to 12½ per cent., which would not impose a hardship on the manufacturers, and which might reasonably be expected to lessen the danger from de-

[1] Shown in the *Railroad Gazette* Nov. 22.

[2] Two reports have been presented to the Association by the Committee on Standard Rail and Wheel Sections, a majority and a minority report, and the chairman requests further time. Your executive committee is of the opinion, therefore, that action on both of these should be deferred, on the ground that no benefit to the members of the Association can be derived from the discussion on the floor of the convention at this time of a subject which is so full of undetermined technical points.

Your committee further recommends that the Committee on Rail and Wheel Sections be requested to continue its investigations, to employ competent experts, and to expend such sums necessary for this purpose as may be authorized by the executive committee.

The attention of the members, however, is called to the fact that the members of the Committee on Rail and Wheel Sections are unanimous in all of their recommendations, except as to chemical composition and discard, among others concerning better rail sections and an improved form of report of rails, and that any member may avail itself at once of these recommendations.—*Report of Executive Committee.*

fective rails. It is, of course, recognized that the percentage of discard depends somewhat on the size of the ingot and other circumstances. The moderate fixed percentage suggested is, however, believed to be sufficiently conservative for all prevailing conditions. Moreover, the railroads would doubtless be entirely willing to bear the slightly increased cost due to added discard. It is, of course, to be understood that such percentage should be subject to change in the light of further information obtained either by tests or by experience in service.

In the matter of height of drop, it is to be noted that the heights specified by the committee for the present rail sections are practically the same as those in the specifications of the American Society for Testing Materials. For the proposed new sections the height of drop is increased 3 ft. for a 100-lb. section and 2 ft. for weights of 90 lbs. and under.

Conceding the validity of the claim of the manufacturers that the ore supply permits of only a limited supply of Bessemer steel rails with a phosphorus content not exceeding 0.085, recourse must be had either to Bessemer rails of sufficiently increased section to meet safely the requirements of modern traffic conditions, or to the use of open-hearth steel rails, which may be obtained to a limited extent to-day, with a phosphorus content ranging from 0.03 to 0.06 per cent. and with discard from 15 to 25 per cent.

The committee embodies in its report "cardinal principles" governing the design of rail sections. It is to be hoped that the further investigation of the committee will lead to the establishment also of cardinal principles governing the manufacture of steel rails, especially in the matter of lighter reductions in rolling, from the ingot to the finished section, with due regard to the influence of the finishing temperature. The specifications in the majority report are in the right direction, in that they provide for a drop test on every heat of steel on rails made from the top of the ingot, and in that the permissible percentage of No. 2 rails is limited to 5 per cent.

It is especially reassuring to find that these changes were accepted by the representatives of the leading manufacturing interests who were invited to confer with the committee. It is not to be doubted that the work of the committee of the Railway Association has considerably advanced the harmonization of the conflicting specifications, and it is to be hoped that at no distant date a specification will be evolved which will be acceptable to all parties in interest, and which will be generally adopted by the various engineering societies. With this end in view, it is greatly to be desired that the committee of the Railway Association will prosecute the further investigation of the subject vigorously, and that the results of their study will be laid before the profession at the earliest possible date.

Train Accidents in November.[1]

Our record of train accidents occurring on the railroads of the United States in November includes 20 collisions and four derailments, 24 accidents in all. This record is not published in full except in the cases of the few accidents which are especially prominent—in the present instance two collisions. The record of "ordinary" accidents—which term includes, for our present purpose, only those which result in fatal injury to a passenger or an employee or which are of special interest to operating officers—is given at the end in the shape of a one-line item for each accident, showing date, location, class and number of deaths and injuries. The items of which details are given are indicated in the tabular statement by the use of italics. This record is based on accounts published in local daily newspapers, except in the cases of accidents of such magnitude that it seems proper to send a letter of inquiry to the railroad manager.

The collision at Larimer, Pa., on the 12th, occurred about 1:30 a.m. Passenger train No. 28 eastbound, the 18-hour Chicago-New York train, was turned through a crossover to the westbound track and ran into a westbound freight, which was at a standstill. Both engines were badly damaged, as were the first car of the passenger train and six cars of the freight. One fireman, one brakeman and four other employees and six passengers were injured, none of them badly hurt. The signalman had orders to send the passenger train east to the next station on the westbound track, after that track should have been cleared, but he appears to have forgotten that the westbound freight was standing near his tower.

The rear collision of freight trains at Towanda, Pa., on the 10th would not have been unusually disastrous, so far as the destruction of property is concerned, had it not been for a fire which immediately broke out and which destroyed everything combustible about the wrecked cars and engine. Indeed, the colliding train—a regular freight train—was running slowly, under a permissive signal; but the case is of interest as one in which an inquest brought out the real cause. As reported in a local paper, the engineman who was at fault frankly testified that he saw the train ahead, knew about how far it was from him, and yet instead of keeping a close watch on its movements he turned his eyes away and assisted the fireman. Because of the poor quality of the coal or the inexperience of the fireman, the engineman deemed it necessary to attend to the fireman's work instead of to his own immediate duty; a plain case of trying to do two things at once and not putting the first duty first. But as is usual in such cases the jury tried to exonerate the engineman, declaring that the collision was caused by "the engineer and others not being in position to see signals given by the flagman and through escaping steam through defective packing of the piston valve."

TRAIN ACCIDENTS IN THE UNITED STATES IN NOVEMBER, 1907.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	No. persons reported Kil'd.	No. persons reported Inj'd.
*3.	Atl., Gulf & Southern.	Morganville.	bc.	P. & Ft.	2	6
3.	Baltimore & Ohio.	McMillan.	rc.	Ft. & Ft.	3	1
3.	St. Louis & Iron Mt.	Little Rock.	bc.	P. & Ft.	4	9
5.	New York Central.	Grimesville.	rc.	Ft. & Ft.	1	1
6.	Southern Pacific	Portland.	bc.	P. & P.	1	0
9.	Boston & Albany.	W. Brookfield.	xc.	P. & Ft.	1	3
9.	Wabash	Fort Wayne.	xc.	P. & Ft.	0	10
*10.	*Lehigh Valley*	Towanda.	rc.	Ft. & Ft.	1	0
12.	*Pennsylvania*	Larimer.	xc.	P. & Ft.	0	6
13.	Wabash	N. Alexandria.	rc.	Ft. & Ft.	1	5
14.	New York Central	Buffalo.	rc.	Ft. & Ft.	1	4
16.	Pennsylvania	Howard's.	xc.	Ft. & Ft.	3	0
18.	Oregon Sh. Line.	American Falls	rc.	P. & Ft.	2	1
18.	Wh. & Lake Erie.	Steubenville.	bc.	Ft. & Ft.	3	0
18.	Yazoo & M. Val.	Melton.	bc.	Ft. & Ft.	2	1
19.	Vandalia	Vevay Park.	bc.	P. & P.	1	2
19.	Washington Terminal.	Washington.	bc.	P. & P.	0	17
20.	Vandalia	Farmdale.	bc.	P. & Ft.	1	7
24.	Central N. England.	St. Elmo.	xc.	Ft. & Ft.	1	0
26.	Phila. & Reading.	Philadelphia.	rc.	Ft. & Ft.	3	1

Derailments.

Date.	Road.	Place.	Kind of train.	Cause of derlmt.	No. persons reported Kil'd.	No. persons reported Inj'd.
3.	Central of N. J.	Pittston.	Pass.	d. road.	1	1
8.	Del., Lack. & Westn.	Fargo.	Pass.	acc. obst.	1	4
15.	Wabash.	Dillon.	Pass.	unx.	0	7
25.	Mobile, J. & K. C.	Laurel.	Pass.	b. flange.	0	8

Of the nine serious electric-car accidents reported in the newspaper in the month of November, five resulted in fatal injury to one or more persons, namely, Indianapolis, Ind.; Woonsocket, R. I.; Chicago, Ill.; Fort Worth, Tex., and Waterbury, Conn. In the last named case, which occurred on the 29th, a street car stalled on a railroad crossing was struck by a freight train and five persons were killed.

Two collisions on elevated lines in New York City, while not particularly disastrous in their results, are noticeable by reason of the circumstances attending them. On the 11th, at Thirty-fourth street, on the Sixth avenue line, a northbound train, just starting away from the station, ran into the rear of a preceding train which had been stopped, and the momentum of the moving train was such that its leading car was lifted about 7 ft. and pushed to one side so that it barely escaped falling into the street. The explanation—common in cases where trains are required to run under control—is that the motorman thought that the preceding train would start before he got to it. A collision of loaded passenger trains on the Manhattan elevated lines is noticeable by reason of the remarkable infrequency of such collisions on these lines throughout a period of 25 years and more.

The other collision, which occurred on the 25th, was on the Subway line, but on that portion of it which is on an elevated structure. In this case a northbound train, leaving the last station before reaching the terminus, ran at unchecked speed into the rear of a preceding standing train, and the motorman was killed. There were few passengers in the trains, however, and only four were injured. The motorman, although a faithful and sober employee, who had been several years in the service, proceeded on his way without even noticing the preceding train, although it was in broad daylight and there was nothing in the way to prevent him from clearly seeing it, the rear car being only about 300 ft. away. As the physicians who examined the motorman's body found no evidence of heart disease or apoplexy, and as he had not had time to fall asleep after starting, this would seem to be a simple case of absent mindedness. The man must have allowed his attention to be distracted by something at the side of the road.

[1]Abbreviations and marks used in Accident List:

rc.....Rear collision.
bc.....Butting collision.
xc.....Other collisions; as at crossings or in yards. Where only one train is mentioned, it is usually a case of a train running into a standing car or cars, or a collision due to a train breaking in two on a descending grade.
b.....Broken.
d.....Defective.
dr.....Defect of roadway.
eq.....Defect in car or engine.
n.....Negligence.
unf.....Unforeseen obstruction.
unx.....Unexplained.
derail.....Open derailing switch (negligence of engineman or signalman).
ms.....Misplaced switch.
acc. obst..Accidental obstruction.
malice....Malicious obstruction of track or misplacement of switch.
boiler.....Explosion of boiler of locomotive on road.
fire.....Cars burned while running.
Pass.....Passenger train.
Ft.....Freight train (includes empty, engines, work trains, etc.).
*Wreck wholly or partly destroyed by fire.
†One or more passengers killed.

Lehigh & Hudson River.

This is the road over which President Mellen wishes the Central of New Jersey, the Philadelphia & Reading and the Baltimore & Ohio to send all their traffic for the New York, New Haven & Hartford, which would receive it over the Poughkeepsie bridge and the Highland division, now double tracked from Hopewell as far as Danbury, Conn., and soon to be double tracked and improved as far as Waterbury. For over two years now the Lackawanna has been sending its shipments for New Haven territory by this route with apparent satisfaction to all concerned. The Central of New Jersey is at present also sending some traffic over the Lehigh & Hudson River. This route, however, would give, in most cases, to the roads in the Reading system a shorter proportion of the haul on New England shipments. The corresponding advantage would go mostly to the Lehigh & Hudson River.

This railroad is not controlled by the New York, New Haven & Hartford. Of the 13 directors of the Lehigh & Hudson River, the presidents of the Lackawanna, the Ontario & Western, the Erie and the Lehigh Valley and the fourth vice-president of the Pennsylvania make up five. The other eight include George F. Baer, President of the Reading and of the Central of New Jersey; Joseph S. Harris, a director of the Reading Company, the Philadelphia & Reading Railway, the Philadelphia & Reading Coal & Iron Company and the Lehigh Coal & Navigation Company; J. Rogers Maxwell, Chairman of the Executive Committee of the Central of New Jersey; Robert W. de Forest, Vice-President, General Counsel and a director of the Central of New Jersey; Lewis A. Riley, President, who is also President of the Lehigh Coal & Navigation Company, which leases 192 miles of railroad to the Central of New Jersey; Morris Rutherfurd, Vice-President and General Manager, and James M. Duane, a member of the banking firm of Brown Bros. & Co., and a director of the Lehigh Coal & Navigation Company. The remaining member of the board is Alfred Ely.

Thus, four directors are closely associated with the Reading-Central of New Jersey interests and three others with the Lehigh Coal & Navigation. At the recent hearing before the Interstate Commerce Commission at Washington in regard to the New Haven's proposed cancellation of through tariffs with his companies via New York harbor, President Baer was quoted as saying in reply to a suggestion of President Mellen that the Lehigh & Hudson River was available for moving such shipments, that "I do not control one-tenth of it." This seems a remarkable statement, for judging by the directorate of the Lehigh & Hudson River, the Reading-Central of New Jersey interests and the Lehigh Coal & Navigation together have actual control, with the other anthracite coal railroads owning the rest of the stock. More important still, on the official map in the last annual report of the Reading Company, issued October 14, 1907, the Lehigh & Hudson River is shown as a line "controlled through ownership of majority interest." Why then is President Baer so loath to have it used?

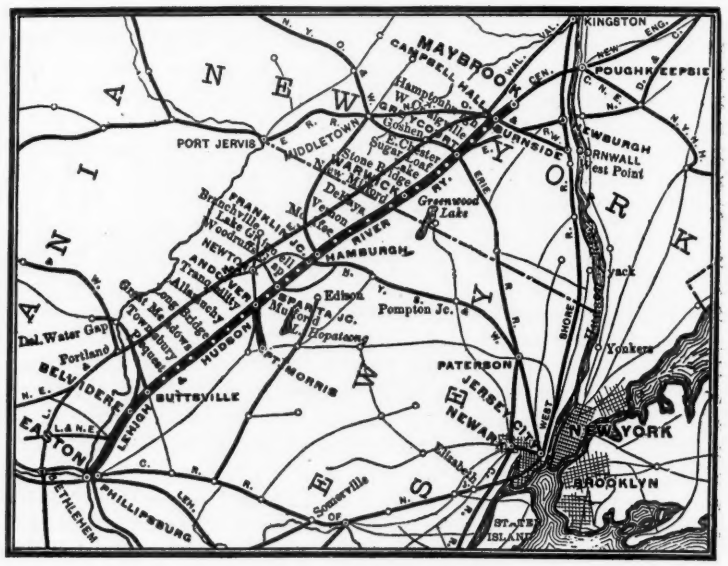
The beginning of the present interchange traffic between the Lackawanna and the New Haven marked a new era in the history of the Lehigh & Hudson River. From that time it began to take shape as a through modern railroad, instead of being a local line moving enough traffic to keep itself alive. Gross earnings, which were $482,000 in 1905, rose to $844,000 last year. Net earnings were $167,000 in 1905 and $304,000 last year. The increase of 1907 over 1906 in gross earnings was 30 per cent., and in net, 19 per cent.

Last year there was an increase of 93 per cent. in tax payments, owing to the new law in New Jersey, and a considerable increase in fixed charges because of the issue of $239,000 of debenture bonds and $400,000 of equipment trust certificates; so that net income was not much larger than in the previous year. As over twice as much was charged off for depreciation and adjustments, the year's surplus was only about half as much as in 1906. The year, however, has been a prosperous and favorable one, for the business of the road and its capabilities for handling it have grown.

The cost of additions and betterments made during the year was $993,893, which is an expenditure of over $10,000 a mile for each of the 99 miles operated and of $13,250 for each of the 75 miles owned. This is probably a larger expenditure per mile for additions and betterments, especially since it includes no increase in mileage, than was made last year on any other railroad in the United States. The largest items under this head are $414,000 for new freight cars and $100,000 for new locomotives. The bridge over the Delaware river at Easton, Pa., which is 1,034 ft. long and was built partly of second-hand material in 1899, is being rebuilt. This bridge forms the link between the connecting railroads south of the Delaware river and the southern terminal yard of the Lehigh & Hudson River at Phillipsburg, N. J. The bridge is to be made strong enough to carry the heaviest locomotives in use on any of the connecting roads. Masonry for the new piers has been finished and the new bridge is being erected. The cost will be about $125,000, part of which was advanced during the year. There was also $38,000 spent out of capital for part of the cost of new passing sidings and switches at 11 different points along the line.

Many other improvements were charged to maintenance of way and structures under operating expenses. This expense increased 19 per cent. over the previous year and amounted to $989 per mile, against $821 in 1906. There were 21 miles of 80-lb. rails laid during the year, and since June 30 enough more 80-lb. rail has been received to lay the entire line with that weight. Most of this has already been laid. Although there were less than 2,000 more ties placed in track than in the previous year, the cost of tie renewals increased 50 per cent., due to the fact that formerly the supply of ties was cut along the line but last year yellow pine ties from other regions had to be bought.

There was a large decrease in maintenance of equipment expenses, which were 44 per cent. less than in the previous year. Repairs and renewals of locomotives cost $595 per locomotive, against $1,838 in 1906; of passenger cars $239 per car, against $176 in 1906, and of freight cars $13 per car, against $30 in 1906. The 1907 figures are in each case the lowest of those for any railroad whose report has been reviewed in the *Railroad Gazette*. There is a reason for this. Under the equipment trust for $400,000, dated May 10, 1906, there were put into service last year 250 hopper bottom gondola cars; 10 low-side gondolas and 25 steel ore cars, all of 80,000 lbs. capacity; 75 box cars of 60,000 lbs. capacity, and six locomotives. Six more locomotives were bought on locomotive rental notes for $68,594, payable quarterly over a period of three years, a cash payment of $15,742 having been made when the locomotives were received. On June 30, 1906, the company owned only 18 locomotives, so that this increase of 12 was an increase of two-thirds in the total



Lehigh & Hudson River.

locomotive equipment. The number of freight cars rose from 790 in 1906 to 1,088, an increase of 38 per cent. Considering that two-fifths of the locomotives were new, the small amount spent on locomotive repairs can be explained. The same argument does not apply to the passenger cars; their maintenance charge in each year is very low. One-third of the freight cars were new, but even so, the average repair cost of $13 per car is low, particularly after a year when, with no new cars whatever to bring down the average, the freight car repair cost was only $30. One explanation of these low charges is probably that almost all of the road's high grade traffic is carried in cars of other companies. New shops are now under construction.

Conducting transportation expenses increased 53 per cent. over the previous year, and general expenses 55 per cent. Conducting transportation amounted to 43 per cent. of gross earnings, against 36 per cent. in 1906. This was due both to the increased volume of traffic, the greater cost of labor and material and a further special cause. The increase in traffic is shown by the increase of 50 per cent. in the freight-train mileage and of 45 per cent. in the ton mileage. There were large increases in cost of fuel for locomotives and in all accounts involving wage payments. Hire of equipment, which appears to include per diem payments, rose from $90 in 1906 to $2,305 last year, an increase of 2,460 per cent. During November and December, 1906, and January, February and March, 1907, the conducting transportation costs were particularly high in proportion to the amount of traffic. This was due to the backing up of traffic on the line, with consequent congestion and added expense, by the inability of the New York, New Haven & Hartford to promptly move the through traffic to the east.

Ores were the largest single item of tonnage, amounting to 22 per cent., most of which originated on the line. Limestone, which also originated mostly on the line, furnished 10 per cent. of the tonnage. Merchandise amounted to 8 per cent., and miscellaneous to 9 per cent., both of these groups of high grade tonnage being almost

entirely received from other carriers. The traffic in grain; flour; other mill products; cotton; other packing house products; wool; hides and leather; anthracite coal; bituminous coal; iron products; and cement, brick and lime, which were the most important of the other tonnage groups, was all or nearly all received from other carriers. The total tonnage originating on the road was 735,000 tons, of which 561,000 tons were ores and limestone. Outside of these two commodities, the tonnage of no commodity originating on the line amounted to as much as 25,000 tons. The interchange tonnage amounted to 1,240,000 tons, or 63 per cent. of the total. The Lehigh & Hudson River has one advantage which counts for much in the economical operation of the road: the traffic is almost evenly balanced. Last year 52 per cent. of the total was carried eastward and 48 per cent. westward.

The future of this small property is a matter of great interest. There is no doubt that the transfer by car floats from the New Jersey side of the Hudson river around the south end of Manhattan island and up the East river to the Harlem river terminal of the New Haven is a costly, slow and dangerous method of interchange. It is also true that the New York division of the New Haven is overburdened with traffic and that the interchange traffic with the Pennsylvania and Lehigh Valley, the most important of the New Jersey connections of the New Haven, is likely to be all that can be conveniently handled on that division. Also, the Poughkeepsie bridge route is being steadily improved. If President Mellen is successful in his contention that the roads in the Reading system shall follow the example of the Lackawanna and send their traffic for New England by this route, the importance of the Lehigh & Hudson River will necessarily be greatly increased, particularly as on this traffic it will secure a haul over the whole length of its line, while on the Lackawanna's business, which is received at Port Morris, it gets a haul of little more than half its length. If in this way the Lehigh & Hudson River is to be a main gateway for traffic between points west of the Hudson river and New England, there is a possibility that the Lehigh & New England, which parallels it for its whole length on the west and is owned by the Lehigh Coal & Navigation Company, in spite of its worse grades and curves, may also be used as a through connection.

The results of operation of the Lehigh & Hudson River for the last two years are shown below:

	1907.	1906.
Mileage worked	99	99
Passenger earnings	$44,414	$40,429
Freight earnings	781,866	601,891
Gross earnings	844,335	662,386
Maint. way and structures	97,951	82,015
Maint. of equipment	45,199	65,240
Conducting transportation	362,485	237,454
General expenses	34,417	22,437
Operating expenses	540,051	407,145
Net earnings	304,283	255,241
Net income	125,177	108,132
Depreciation and adjustments	81,790	35,641
Year's surplus	43,387	72,492

NEW PUBLICATIONS.

The Car Wheel. Giving the results of a series of investigations by George L. Fowler, M.E. Published for private distribution by the Schoen Steel Wheel Co., Pittsburgh, Pa., 1907. Boards, 5 in. x 9 in.; 161 pages, and numerous illustrations.

It is seldom that the results of such an exhaustive series of investigations, primarily carried out for the sole purpose of determining the standards of quality and workmanship which must be met by a new product in competition with old and well tried products, are given to the public in such complete detail. Mr. Fowler in the beginning was confronted with an almost total lack of published data as to many of the properties of car wheels which were later investigated, and practically the whole of the contents of this book is original data here made public for the first time. One chapter on the lateral thrust of wheels against the rail has already been reprinted by special permission of the Schoen Co. in the *Railroad Gazette* of Nov. 15, 1907, and another on the areas of contact between wheel and rail is reprinted in another column in this issue. These will give a better idea of the character of the investigations made than any extended review. Other chapters consider the design of the solid rolled and forged steel wheel; comparative physical and chemical properties of solid rolled and forged steel wheels, steel tires and cast-iron wheels; studies of heat treatment and penetration of physical work in rolling from the micro-structure of the metal; co-efficients of friction between wheel and rail. The last chapter is a presentation of advantages claimed for the Schoen solid rolled and forged steel wheel based on the tests recorded in previous chapters, together with the results of a number of actual service tests.

The investigations which were made covered a period of over two years. Perhaps the most striking thing about them is the fact that they reveal how completely unexplored as yet is the field of railroad dynamics. Wellington and Forney touched on the edges and Fowler has here gone somewhat deeper into some of the unsolved problems, but there yet remains a vast and profitable field of investigation. While the book is intended to promote more extended knowledge of the properties of the Schoen wheel, at the same time one is struck by the impartial presentation of the results of the various investigations and the value of the data given is by so much increased.

As a piece of book-making the volume is a work of art. It is printed on heavy vellum paper with illuminated chapter headings, and the illustrations are printed on loose leaves of cream-colored plate paper, pasted to blank pages. The binding is plain board with embossed gold letters. The book is intended for private distribution among railroad officers interested in the service requirements of car wheels.

Railway Shop Up-to-Date.—A reference book of up-to-date American railway shop practice. Compiled by the Editorial Staff of the *Railway Master Mechanic.* Chicago: Crandall Publishing Co. 243 pages; 9 in. x 12 in. Cloth. Price, $4.

The purpose of the compilers of this volume was to present a record of the best existing practice in railroad shop design, construction and equipment. It has been about three years since any comprehensive work of this character has appeared and in that time there has been material progress. There was need, therefore, of bringing the record up to date, and this has been well done in the present volume. Data has been selected with care and logically arranged, the idea being to make it equally serviceable in designing new plants or improving existing ones. This book contains some good features not found in earlier volumes, particularly in the matter of tool and electrical equipment. For the former, tables are prepared for machine and erecting shops on a pit basis. The proportion of different machine tools for a single pit is worked out and figures then derived for shops of 12, 15, 24 and 48 pits, simply by multiplying the pit figure by these numbers. The tabulation also includes the total of each kind, and the number of each size, or class, of tool for shops of a given number of pits. The basis on which the tables have been worked out is stated to be more liberal in its allowance of tools than is the general practice. Lists of the machine tool equipment for several representative shops are given, also for blacksmith and woodworking shops. For the power plants there is a table of data of 15 representative power houses, and diagrams of the power distribution at four large electrically-driven plants. The illustrations for each chapter are grouped at the end of the chapter instead of being scattered through the discussion. They are all line engravings, except for a number of storehouse photographs. The compilers of the volume were assisted by an advisory committee consisting of C. A. Schroyer, Superintendent Car Department, C. & N.-W.; M. K. Barnum, General Inspector Machinery and Equipment, C., B. & Q., and R. D. Smith, Assistant Superintendent Motive Power, B. & A.

CONTRIBUTIONS

Rail Specifications—the Discard from the Ingot.

Altoona, Pa., Dec. 12, 1907.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I do not know which of my many utterances in regard to steel rails your correspondent, "Railroad Officer," has chosen to base his statement on in your issue of November 22d, that I with others "assert that the railroads cannot afford to do otherwise than unite on the requirement of a definite discard." It is quite probable that something which I have said would give color to such a view, but it is fair to say at the present time that the more the question of discard is studied, the more difficult it becomes to have a positive and definite view in regard to it.

It would hardly be wise, at this time, to go into the whole question of discard. There is too much lack of positive information as to how the majority of rails fail, to tie up these failures satisfactorily with the discard. This lack of positive information on the part of the railroads was, as we understand it, the principal cause of the inability of the committee of the American Railway Association to make a more satisfactory report at the recent meeting of that body. It is hoped and believed that by means of a careful study within the next year or two, of rails which fail in track, a good deal more definite information will be obtained. At the present time we hardly feel willing to say more than that probably the poorest steel for rails in the ingot is somewhere from 15 to 18 per cent. down from the top. Also that there are two points involved in this poor steel, namely, segregation and physical defects in the metal. Under the head of physical defects are embraced all that is commonly known as the "pipe," and bubbles or cavities or sponginess which does not weld up under the rolling. We have fairly positive evidence that a rail having internal physical defects is almost always a segregated rail. We do not have as definite information that a segregated rail, free from internal physical defects, will fail in service. The great need to-day in rail manufacture is

some test by which internal physical defects in the rail can be detected. Many rails fail in the middle of the length of the rail, and an examination of these failures shows almost without exception that there was an unwelded up portion in the rail, which, under the pounding of the traffic, gave way. If now we had some means of telling whether there was an unwelded portion in any part of a rail, the whole question of discard could, we think, be ignored. It is believed with good reason that the drop test as at present conducted, is not sufficient for this purpose although this point needs further study.

Our ideas at the present time are: (1) that a test should be made from every blow; (2) that the inspector should be entitled to select a crop end, or a portion of a rail which shall be used for the test; (3) that he should choose for test steel that came from 15 to 18 per cent. down from the top of the ingot. At present it will be necessary, of course, to use the drop test or some modification of it. (4) In case the sample fails, the whole heat should be rejected, or at least the top rail from each ingot in that heat; and, (5) and, perhaps most important of all, no retests should be made. If this scheme could be carried out, we think the whole pestiferous question of discard could wisely be left in the hands of the manufacturers.

It may not be amiss to add that this proposed method of testing commercial steel products, without any reference whatever in the specifications to discard, has worked charmingly for a number of years now. Driving axles, car axles, crank pins, billet steel, etc., are and have been for years tested and accepted, or rejected in accordance with the methods outlined above, with no reference whatever in the specifications to discard.

In the matter of rails it is a fair question, I think, whether in the past, the railroads have not made a mistake in that they have specified too much. It is, of course, difficult to draw the line and say positively how much should be specified and how much left to the manufacturer, but I think it hard to refute the statement that the assumption by the consumer of the right to specify a discard has resulted in relieving the manufacturer of a responsibility which he should bear. It is the function of the manufacturer to make rails and offer them for acceptance. It is the function of the consumer to apply such tests and inspection as will prevent the acceptance of inferior or hazardous material, and properly safeguard the interests for which he is responsible. If a portion of the energy that has been spent in contending over discard had been spent in devising proper tests and methods of making these tests efficient in excluding rails that are piped or otherwise inferior, I am confident that so many poor rails would not now be in track, and that, as already stated, the question of discard could safely be left entirely to the manufacturers.

CHAS. B. DUDLEY.

William Cotter.

Foreign Railroad Notes.

The Traffic Commission of the city of Berlin has decided to build a subway running northwest and southeast through the heart of the city from Charlottenburg to Rixdorf. The estimated cost is $15,000,000. Five new surface lines are also projected.

The people of the village of Simplon, on the famous Simplon road, have trouble in communicating with their Swiss fellow-countrymen in the winter. The highway is no longer kept open in the winter, but can be traveled down the Italian slope, and thence by the tunnel the way is open to Switzerland; but if any goods are taken, they have to pass through the custom houses of both countries; and cattle are subject to veterinary inspection as exports from Switzerland to Italy, and then in two or three hours as exports from Italy to Switzerland. The highway is closed from Oct. 1 to May 1.

William Cotter.

William Cotter, General Manager of the Pere Marquette, was elected President of the company on December 14, succeeding President Underwood, of the Erie, who was elected President of the Pere Marquette in the fall of 1905, succeeding Eugene Zimmerman, but whose resignation has been merely a formal one, as Judson Harmon, Receiver, has been in charge of the road. The stockholders recently approved the reorganization plan. This provides for the cancellation of the Cincinnati, Hamilton & Dayton's lease of the property and the issue to stockholders of $5,000,000 in debentures, the proceeds of which will retire receiver's certificates and other indebtedness and so put the company on its feet. It is expected that the receivership will be wound up early in 1908. All of Mr. Cotter's railroad experience has been in the operating department, and in this work he has developed marked ability in handling men. In his direct relations with employees, he is a rigid and dispassionate disciplinarian. He followed Russell Harding to the Pere Marquette from the Missouri Pacific. On that road he had been Manager, while Mr. Harding as General Manager was his immediate superior. In this position Mr. Cotter spent his time dealing directly with the operating forces and thus encountering all labor troubles. He was born in 1858 at Bloomington, Ill., and began railroad work when 16 years old as a telegraph operator on the Chicago & Alton. From 1878 to 1880 he worked as operator on the St. Louis, Iron Mountain & Southern and was then appointed train despatcher and later Trainmaster of the same road at Little Rock, Ark. He served for a year as despatcher on the Chicago, Milwaukee & St. Paul and then went to the Wabash, St. Louis & Pacific, serving as train despatcher on that road and its successor, the Wabash, until 1890. He was then appointed Trainmaster of the St. Louis division. Six years later he went to the Grand Trunk as Superintendent of the Eastern division and in 1899 was made Superintendent of the Western division of that road. In 1901 he was appointed General Superintendent of the St. Louis, Iron Mountain & Southern and the next year was promoted to the position of Manager of the Missouri Pacific system. He went to the Pere Marquette as General Manager in 1904 and has continued in that position since that time.

Car Accountants' Meeting.

The regular meeting of the Association of Transportation and Car Accounting officers was held at Chicago, December 10. At the opening session Hon. W. J. Calhoun gave an interesting address on the relations of the transportation department to the commercial world.

The Committee on Car Service recommended that Per Diem Agreement Rules No. 5 be eliminated from the code of per diem rules, and that all terminal expenses be included and adjusted in the switching tariff. The rule has been in force five years and has had the desired effect of inducing the switching roads to become parties to the Per Diem Rules Agreement.

The Committee on Office Methods and Accounting has in preparation a complete set of abbreviations to be used in reporting all freight cars, and proposes that every box car shall have at the lower left-hand corner of the side of the car the number of the car with these reporting initials immediately above it. If it is desired to show the name of the road in a less abbreviated form, the right-hand end of the car may be used.

The association approved the committee's proposal, but other associations will be conferred with before final action is taken.

The committee recommends that tracers for carload shipments be indexed according to the two ending figures of the car number. Each item thus indexed can be given a consecutive file number, and thus it will always be easy to quickly find all the papers relating to a certain tracer. This the association approved.

Regarding average miles per car per day, this committee reaffirms the recommendation adopted at St. Louis in 1905 that in such

statistics all cars be included, except those in use by the maintenance of way department. Bad order cars should be included, but may be entered as a separate item. This subject was referred back to the committee, as was its recommendation to charge interest on per diem not promptly reported. Unreported per diem is constantly increasing, and the committee recommends therefore that on amounts not reported within 30 days, interest be charged at one-half of 1 per cent. a month, to continue until the end of the month in which the per diem is reported.

The committee offered a resolution providing for having daily junction reports covering receipts as well as deliveries; also that junction card reports be always sent by United States mail. This was adopted.

The Committee on Conducting Freight Transportation, reporting on weight marks on freight cars, recommended a better compliance with the rules of the American Railway Association and the Master Car Builders' Association. Where a number of new cars are turned out of a shop together, the weight of one or a few is frequently taken to indicate the true weight of each car in the entire series.

The discontinuance by the United States Post Office Department of the practice of stamping the day and hour of arrival on letters has caused some inconvenience in railroad offices where it has been necessary to fix the responsibility for delays; and the committee suggests that large railroad offices use a hand stamp to "back-stamp" United States mail immediately on receiving it from the Post Office carrier. Both of these recommendations were concurred in.

Seven Years' Progress on the Wheeling & Lake Erie.

The following charts graphically show the changes during the past seven years in several important factors affecting the operation of Wheeling & Lake Erie. Figure 1 shows the tons of freight hauled per locomotive mile. The locomotive mile is generally considered to be one of the most valuable units by which to judge railroad operations. Beginning with 1905 there has been a striking increase in the amount of work done per locomotive per mile, partly due to the acquisition of 80 large consolidation locomotives, 50 of which were put in service in 1904.

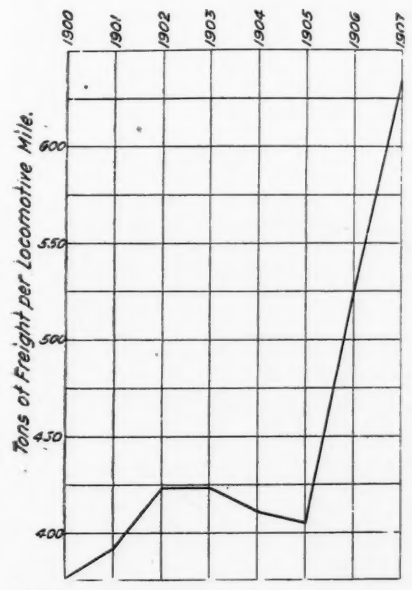


Fig. 1.—Tons of Freight Per Locomotive Mile.

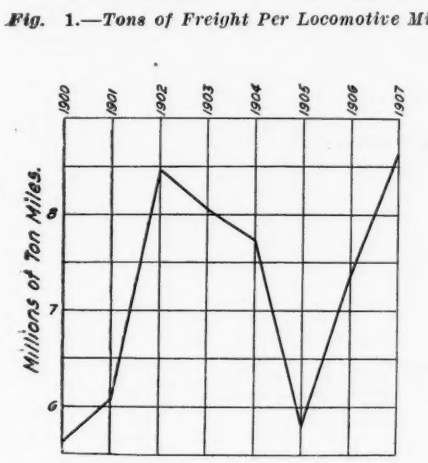


Fig. 2.—Ton-Miles of Freight Handled per Locomotive per Year.

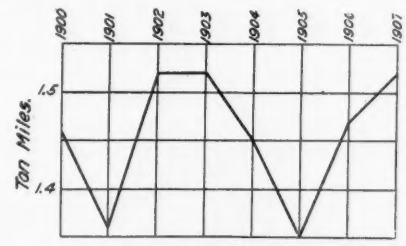


Fig. 3.—Ton-Miles of Commercial and Company Freight Handled per Pound of Coal Consumed.

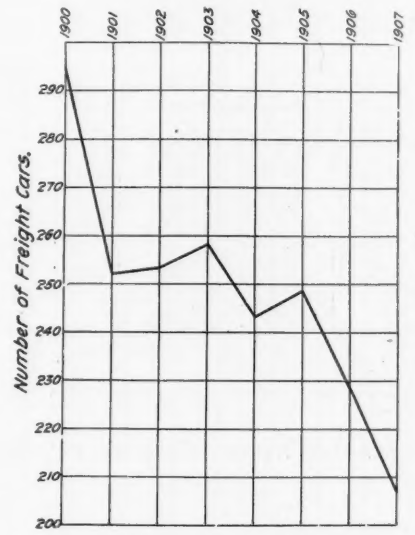


Fig. 4.—Number of Freight Cars Owned per Million Freight-Car Miles Run.

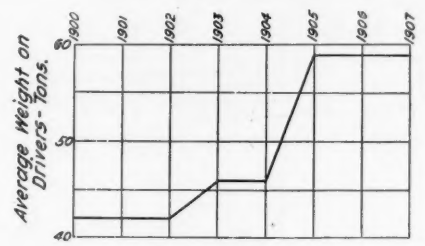


Fig. 7.—Average Weight on Drivers of Locomotives.

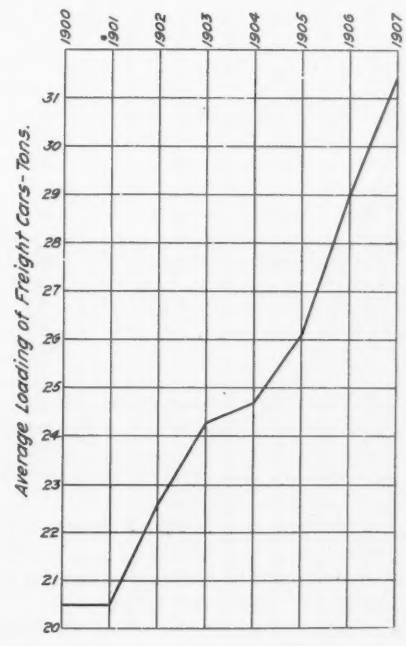


Fig. 5.—Average Loading of Freight Cars.

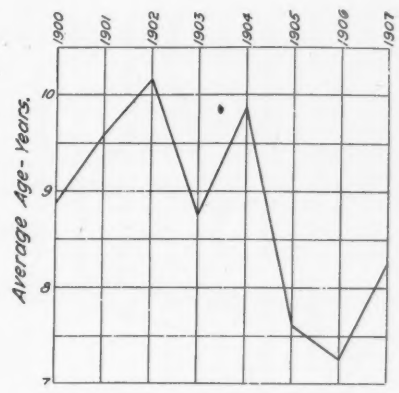


Fig. 6.—Average Age of Locomotives.

Graphic Records of Seven Years' Results on Wheeling & Lake Erie.

The committee recommends that the scales used to weigh new cars be tested by the railroad company's inspector; that wooden cars be reweighed after one year and a star be marked upon the car; after two years to be again weighed and the weight figures to be followed by two stars; and after three years the final weight put on, with three stars. Steel cars should be reweighed after one year and marked with three stars, indicating final weight.

The association adopted the committee's recommendation.

The Committee on Railroad Business Mail finds that labels designed to secure the registration of valuable packages are used for many articles which should not be classed as valuable, and this leads to delay in delivery. The committee recommends that this irregular use of the labels be stopped, and thinks it will reduce the number of registered packages 50 per cent. Where registration is asked for simply for the purpose of securing a receipt from the consignee, the better way would be to enclose with the package a receipt, to be returned as a letter.

Figure 2 shows the ton miles of freight handled per locomotive per year. This record is also based on the locomotive mile, and beginning with 1905 shows a marked increase in the trainload.

Figure 3 shows the ton miles of commercial and company freight per pound of coal consumed and discloses that the amount of work gained from each pound of fuel has since 1905 greatly increased.

Figure 4 shows the number of freight cars owned per million freight-car miles run, and brings out the fact that the volume of business has in general increased much faster than the car equipment.

Figure 5 shows the average freight car loading, which shows a steady increase since 1901, particularly in the last two years, a result due partly to the use of 4,000 new large capacity cars.

Figure 6 shows average age of locomotives and Figure 7 average weight on drivers. In 1904, 50 new consolidation engines were bought, and in 1905, 38 more, as well as 12 new switching engines, making 100 new locomotives in those two years. These purchases

are reflected in the decrease in the average age of the locomotives. As these new engines were large modern locomotives, the average weight on drivers of the locomotive power has greatly increased.

In all of these charts the great progress which has been made during the last three years is noticeable. This is the period during which the present management, headed by B. A. Worthington as First Vice-President and General Manager, has been in charge of the property.

Single Phase in Switzerland.

The Oerlikon Machine Works in Switzerland have for several years been conducting experiments with electrical trains on 14 miles of railroad assigned for that purpose, intended to ascertain the best methods and appliances for heavy railroad work. The experiments are now closed, and the line will be regularly worked hereafter with a single-phase alternating current of 15,000 volts, and 15 current periods per second, with overhead conductors. The experiments are said to have determined that there is no danger in the high currents.

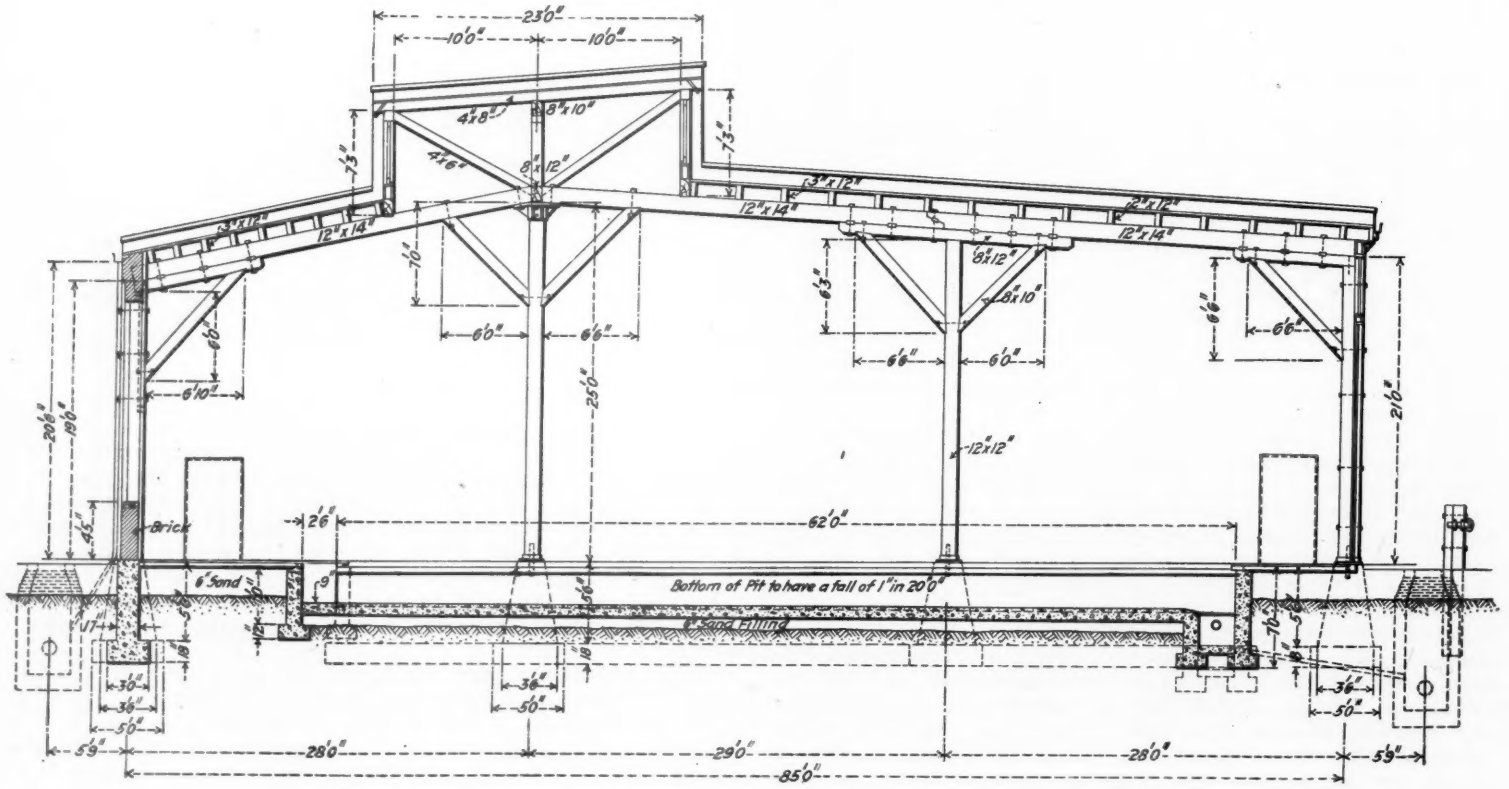
The New Locomotive Terminal of the Chicago Junction.

The Chicago Junction Railway is building a new locomotive terminal at 43d and Robey streets, Chicago, to replace the one at 49th and Halsted streets. The Chicago Junction is Chicago's inner belt road and does all of the switching for the Union Stockyards as well as for a large industrial section of the city. It has 45 locomotives. The facilities at 49th and Halsted had been outgrown; also changes were necessitated by the track elevation work. It was therefore decided to abandon the old terminal and build a complete new one in a more convenient location.

The new plant includes terminal and shop facilities to care for all of the locomotives. The roundhouse is planned for a full circle of 34 stalls. Twelve of the stalls were built last year and are being used. Construction is now under way on 12 more, and the remaining 10 will be added when needed. The radius of the inside circle is 80 ft. 3¾ in. and the stall depth is 85 ft. There is an 80-ft., 150-ton turntable at the center of the circle, built by the American Bridge Co. It works so smoothly that one man can turn an engine on it. It is intended to run it with an air motor later. The building foundations and the turntable and locomotive pits are concrete. The outer walls of the roundhouse are brick and the columns and roof framing are timber. The roof covering is four-ply "Roofrite," made by The Lehon Co., Chicago. The roof monitor is 20 ft. wide and has pivoted sash in both sides, except opposite the smoke jacks, where there are louvres. Each stall has three windows in the outer wall and the inner circles is glass for a height of 42 in. above the doors. Ample provision is thus made for admitting daylight. The smoke jacks are "Transite," made by the H. W. Johns-Manville Co. They are 14 ft. long at the bottom and 3 ft. 6 in. wide. The clearance above the rail is 16 ft.

The doors are wood. Their general features may be noted in the elevations included in the illustrations. They are 16 ft. 6 in.

Elevations of Thirty-Four-Stall Round House for Chicago Junction Railway.



Cross Section Through Round House; Chicago Junction Railway.

high and 6 ft. 6 in. wide. The frame pieces are all 8 in. x 1⅜ in. material, except the top and bottom, which are respectively 10 in. x 1⅜ in. and 12 in. x 1⅜ in. The brace rods are ⅝ in. round, and the hinge straps to which they are secured are ⅜ in. x 3 in. One door in every other stall contains one of the small doors as shown, and in each end and fire wall are two sliding doors, 4 ft. x 7 ft., made of iron. These are adjacent to the inner and outer circles and slide on an inclined runway, making them self-closing.

The engine pits, which are made of concrete as already mentioned, are 60 ft. long and have a fall of 1 ft. in 20 toward the inner circle. A pipe pit 2 ft. 6 in. wide runs around the outer ends of the engine pits. The concrete pit-bottom is crowned, being 8 in. thick at the middle and 6 in. at the sides. There is a 6-in. sand filling under the concrete, and also under the wooden floor of the roundhouse. This floor is 3 in. yellow pine laid on 4-in. x 4-in. sleepers, 2 ft. centers.

The drop pits, which are the air-jack type, were built with the first section of the house last year. There are two, one each for truck and driving wheels, extending under two engine pits. They are 7 ft. wide and 5 ft. 6 in. deep. The four air jacks have a 1-ft. 3½-in. cylinder diameter and a 6-ft. 4½-in. stroke. The jacks are placed in special concrete-lined pits or wells.

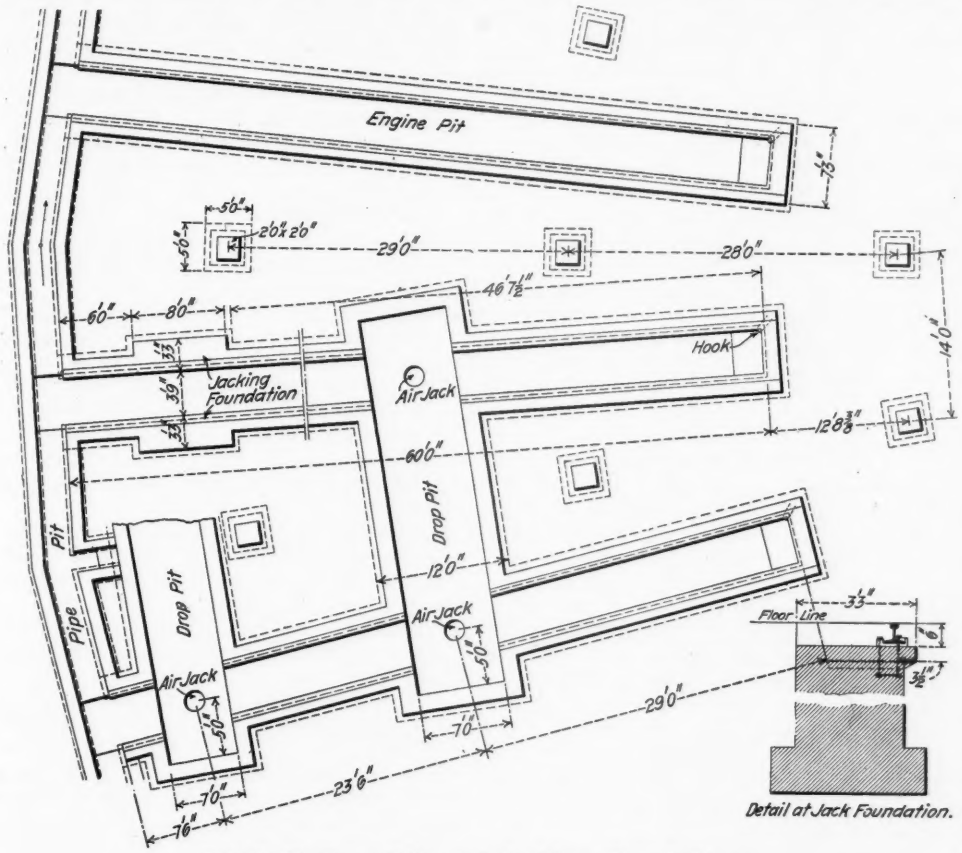
A hot-water washout and boiler-filling system will be installed. The details of this have not been definitely determined as yet. The house will be heated by hot water also, though this will be separate from the other installation.

On the east side of the roundhouse and only a few feet from it the locomotive repair shop is being built. The building is 100 ft. x 200 ft. and contains blacksmith, machine, boiler and erecting shops, with small compartments for pattern and tin shops, and a good-sized store room at one end. Separate buildings are being put up for carpenter shop and boiler house. Two low-pressure boilers for heating will be put in this latter house. The locomotive shop tools and machines will all be motor driven. The electric power is to be obtained from the Union Stockyards station nearby.

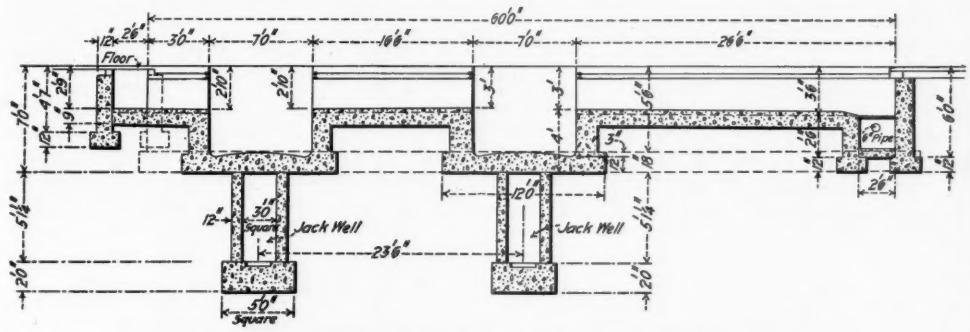
A 250-ton coal chute has been built. The coal is transferred from coal cars to storage bin by a crane with 35-ft. boom and 1½-yd. dipper. There is a locomotive track on each side of the coal chute and two locomotives on each side can be coaled at the same time. Next to the north locomotive track is the crane track and beyond this the coal car track. The crane-boom is long enough to take the coal from the cars and deposit it in the bin across the intervening track. The crane is self-propelling and can switch coal cars when necessary. The sand house is under the coal chute. The sand is shoveled from the cars, and after drying is blown to an overhead bin by compressed air.

Just east of and in line with the coal chute is a double ash pit, a cross-section of which is shown in the drawings. There are three tracks, the middle one being for ash cars and the other ones for engines, with room for six. The pit is of the submerged type and contains about 4 ft. of water at all times. The ash-pans are dumped into the water and the ashes are removed by the coaling crane and deposited in the cars on the center track. It will be observed that the rails of this track and the inner rails of the locomotive tracks are carried on cast-iron columns 4 ft. high, a detail of which is shown, together with the special girder construction employed with these rails. The cast-iron columns are anchored to the concrete by 36-in. anchor bolts. The central channel or trough under the ash-car track is for drainage. It has a drop of 1 ft. in 10 ft. toward one end, from which a 9-in. cast-iron pipe runs to a catch-basin. There are also 4-in. cast-iron pipes through both side walls at intervals. Inverted rails are embedded in the bottoms of the ash pits to protect the concrete from injury by the crane bucket.

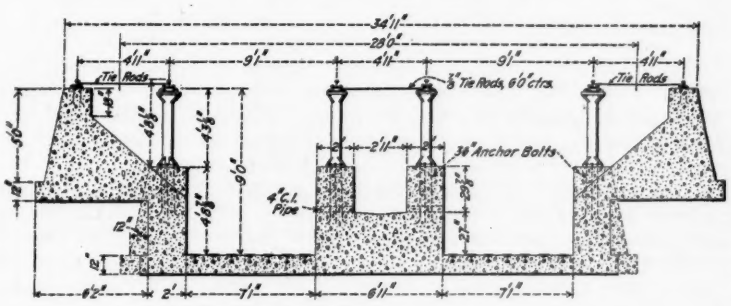
A water tank of 100,000 gals. capacity supplies two water cranes.



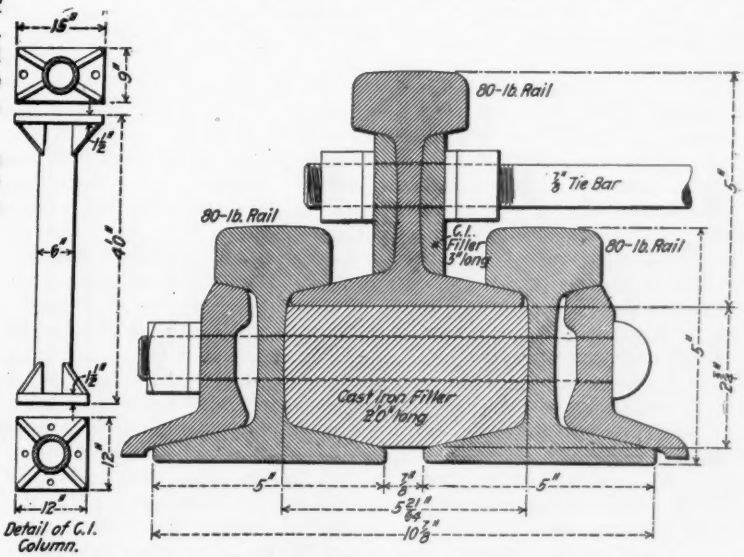
Detail of Drop Pits and Jacking Foundations.



Longitudinal Section Through Engine Pit with Drop Pits.



Cross Section Through Engine Pits.



Detail of Column and Cross Section of Girder Rail.

The tank is wood on a steel framework and is supplied from the city mains. Because of the irregularity of the pressure an electric pump has been installed and operates automatically.

The plans were prepared and the work is being done under the supervision of J. B. Cox, Chief Engineer, to whom we are indebted for information.

1907 Cotton Crop.

The Crop Reporting Board of the Bureau of Statistics of the Department of Agriculture, from the reports of the correspondents and agents of the bureau, estimates that the total production of cotton in the United States for the year 1907-8 will amount to 5,581,968,000 lbs. (not including linters), equivalent to 11,678,000 bales of 500 lbs., gross weight.

The estimated production in 500-lb. bales, by states, is as follows:

Virginia	14,000	Texas	2,490,000
North Carolina	604,000	Arkansas	796,000
South Carolina	1,091,000	Tennessee	298,000
Georgia	1,898,000	Missouri	40,000
Florida	64,000	Oklahoma	919,000
Alabama	1,216,000		
Mississippi	1,536,000	United States	11,678,000
Louisiana	712,000		

Steel Rails; Their Mechanical Treatment; Past and Present.

BY S. T. FIERO,
Inspecting Engineer.

In 1886, when I first began my experience as an inspector of rails, all mills used a greater number of passes in the rolling of their rails than at present. At that time the Joliet mills used 25 passes in the formation of the rails rolled by them. These rails were of 70-lb. pattern for the heavier sections, and down to 48 lbs. for the lighter ones, and I believe that a few 42-lb. sections were rolled.

An ingot of about 14 x 16 in. was used. There were three sets of rolls in the mill; blooming, roughing and finishing rolls. These rolls were divided into 13 passes in blooming rolls, seven passes in roughing rolls, and five passes in finishing rolls. This, with a small ingot of about 225 in. area. I believe that South Chicago was rolling rails with a couple of passes less than Joliet. Edgar Thomson was using 24 passes for rolling rails at that time, divided between four sets of rolls, blooming, roughing, intermediate or short rolls and finishing rolls. Twelve passes in blooming rolls, six in roughing, three in short and two in finishing. This in mill now known as number two. When Captain Jones built the new mill (now known as number one) he reduced the passes in blooming mill to 11, and built three stands of rolls in new addition, with five passes in roughing, five in the intermediate and one in the finishing rolls, a total of 22 passes for rolling rails that had increased to 80 lbs. per yard by that time, possibly 85 lbs. in several instances. I do not know the size of ingot used by him at that time.

Since then the blooming mill has lost four passes. The balance of the mill stands as built by Captain Jones, excepting that the rolls and roll housings have been strengthened, and larger engines have been installed, also a cooling bed has been built between the intermediate and finishing rolls, allowing a finish at a lower temperature than formerly. This has undoubtedly been a help to the quality of the rail produced, but not great enough to offset the detrimental effects of the fewer passes.

To-day mills are rolling rails with 18 passes to form their rails, with the exception of Edgar Thomson number two, the Pennsylvania Steel Company at Steelton, Pa., and the Maryland Steel Company at Sparrows Point, Md. This, with an ingot about 4 in. larger each way than was used with the greater number of passes, making a reduction per pass far beyond the limit of safety, and necessarily producing a great disturbance of the molecular structure of the steel, filling it with small interior cracks, that develop with a greater or lesser degree of rapidity (depending on the size and number of cracks, also on the amount of traffic over the rails), until they break and are entirely out of service. This heavy reduction leaves the rails with a very coarse granular structure, rendering them apparently soft, when possibly the analytical records show that the steel is unusually hard. The higher degree of heat necessary to allow for the heavy reduction is the cause of the coarse granular appearance of the steel, with the heavy reduction as a very good assistant. This is probably why steel with a carbon of 0.55 to 0.60 shows no harder than it showed 20 years ago, with carbon 15 points lower. The rails also show that they are a porous nature, that is, full of small holes about the size of a small pea. This is caused, in my estimation, by the too rapid blowing of the metal during period of conversion, and the too rapid pouring of the steel into the ingot moulds at the time of casting the ingot.

Where mills formerly took from 15 to 18 minutes to blow a heat of steel, they now take from 10 to 12 minutes and are usually nearer the 10 than the 12 minute period. This, with a heavier burden in the vessel than in the earlier days of steel making. These small holes are a segregation of unconsumed gases, that would, under a longer period of blowing at a lower pressure of air, be consumed, or if not entirely consumed, would escape during the period of pouring of ingot, if poured at a slower rate of speed. They are the cause of the soft spots, or battered appearance of portions of the rail (when the balance is in good condition), and are not extremely dangerous.

When the partitions between these small holes disappear, or, in other words, when the gas segregates in one chamber, we have what is known as a pipe. This, of course, is extremely dangerous, and all rails showing pipe should be removed from track as soon as discovered. This pipe more frequently occurs at the top of ingot, but may, and does appear at other points of the ingot. The gases carry with them a great many of the detrimental elements. This is why an analysis of steel at point of pipe shows so badly as compared to the general analysis of the steel.

I would propose the following changes as a help to remedy these ills. Let the steel companies so regulate the pressure of air in their converting mills that it will take 15 minutes or more to convert a heat of steel. Let them take at least one minute in pouring each 2,000 lbs. of steel into ingot mould at the time of casting the ingot. At the present time steel companies take not more than one minute in pouring an ingot of approximately 5,000 lbs. weight, which is too fast pouring, if one desires a solid ingot, free from blow holes and gas pockets.

Then insist that the ingot be left in the soaking pit, or heating furnace, not less than 90 minutes before rolling. Nearly all mills conform to this time of heating of ingots, but there is more carelessness on this point than there should be.

Then let the rolling departments be remodeled so there will be at least 25 passes in the rolls for forming rail section. Let them still use the size ingot that is being used now.

If, at any time the mills find it necessary to increase the size of ingot, let them provide a corresponding increase in the number of passes.

Change the shape of the rail section so that it will be more nearly uniform as to division of metal in head and flange, reducing interior strain in the cooling, and needing less camber on hot bed.

Have another cambering machine at point of delivery of rails to finishing department, and run all rails through this machine, taking out all camber that is still in the rail when cool enough to straighten, thus reducing the number of blows needed to straighten rail to the least possible number. Every blow given a rail under a strengthening press is a bid for a break.

The steel rail question as it stands to-day is a serious one, and a few million dollars should not stand in the way of a number of mechanical changes that will do so much toward the improvement of the physical structure of the rail. It is a well-known fact that in the years spoken of, when rails gave the better service, there were from four to seven more passes in the rolls than at present, and the rails certainly showed better result from the extra work at the lower temperature at which they were finished, with the smaller percentage of reduction the steel had to stand per pass, than what it shows with present practice.

With 20 years experience as an expert rail inspector (during which time I received over four million tons of track material for some of the best roads in the country) to back my judgment, I believe that my suggestions, if acted upon, will go a long ways toward solving the problem now before the public and give the railroads the kind of rail (possibly a better one) that gave them such high satisfaction 20 to 30 years ago.

As a proof of the fact that rails are much more stiff and of a finer granular structure, under a greater number of passes, I give a few results of drop tests of rails made with 23 passes as against the same section made with 20 passes.

Eighty-lb. rail, rolled with 23 passes, receiving a blow of 2,000 lbs., falling free, 20 ft. Rail resting on supports three feet apart. Deflection measurements taken with three feet straight edge, and reading in inches and tenths of inches. These tests give an average deflection of $1^{1}/_{10}$ in. on 25 tests, representing about 3,000 tons of rails. The first 2,000 tons is represented by but one test every fifth heat. The balance shows a test for every heat rolled.

Eighty-lb. rail, rolled with 20 passes, receiving a blow of 2,000 lbs. falling freely, 20 ft. Rail resting on supports three feet apart. Deflection measurements taken with a three feet straight edge, measurements reading in inches, quarters, eighths and sixteenth inches. These tests gave an average deflection of 2.32 in. on 192 tests, representing about 1,500 tons of rails.

In conclusion, the tests show an average deflection of 0.72 in. greater on rails rolled in 20 passes, than on rails rolled in 23 passes, proving most conclusively that where the rails get the greater amount of work and are finished at a lower temperature, they are much finer grained and to a very great degree stiffer than where the steel is tortured into shape by insufficient passes.

I give the test and analytical reports verbatim herewith.

Heat No.	Defl;	Car.	Heat No.	Defl;	Car.	Heat No.	Defl;	Car.
64353	1.8	0.51	64367	1.6	0.50	64381	1.6	0.50
64354	1.8	0.51	64368	1.9	0.51	64382	1.6	0.50
64355	1.6	0.51	64369	1.7	0.51	64383	1.7	0.50
64356	1.8	0.50	64370	1.8	0.50	64384	1.6	0.50
64357	1.5	0.51	64371	1.7	0.52	64385	1.7	0.51
64358	1.5	0.51	64372	1.9	0.52	64386	1.9	0.52
64359	1.6	0.51	64373	1.9	0.52	64387	1.8	0.50
64360	1.5	0.52	64374	1.8	0.50	64388	1.8	0.52
64361	1.6	0.52	64375	1.8	0.52	64389	1.6	0.52
64362	1.5	0.52	64376	1.9	0.51	64390	1.9	0.52
64363	1.7	0.52	64377	1.7	0.51	64391	1.8	0.50
64364	1.9	0.52	64378	1.9	0.51	64392	1.7	0.52
64365	1.8	0.51	64379	1.9	0.51	64393	1.8	0.50
64366	1.6	0.51	64380	1.5	0.52	64394	1.7	0.50

AVERAGE ANALYSIS.

Silicon	Phosphorus	Manganese	Carbon	Sulphur–August 6th, 1907.
0.102	0.086	0.93	0.51	0.049

REPORT OF TESTS ON RAILS MADE IN 20 PASSES.

Heat No.	Defl;	Car.	Heat No.	Defl;	Car.	Heat No.	Defl;	Car.
80338	2-5/16	0.54	80361	2-3/8	0.53	80384	2-1/2	0.56
80339	2-5/16	0.53	80362	Broke	0.52	80385	2-3/16	0.54
80340	2-3/16	0.52	Retest	2-1/4		80386	2-1/16	0.52
80341	2-3/8	0.55	"	2-1/8		80387	2	0.53
80342	2-3/16	0.54	80363			80388	2-1/16	0.56
80343	2-5/16	0.56	80364	2-9/16	0.56	80389	1-7/8	0.53
80344	2-3/8	0.54	80365	2-3/8	0.56	80390	2-1/16	0.57
80345	2-1/4	0.52	80366	2-3/8	0.53	80391	2	0.53
80346	2-1/4	0.53	80367	2-1/16	0.52	80392	2-1/8	0.54
80347	2-1/4	0.56	80368	2-5/16	0.55	80393	2-3/16	0.55
80348	2-1/2	0.52	80369	2-3/16	0.54	80394	2-1/8	0.53
80349	2-5/16	0.56	80370	2-1/8	0.53	80395	2-3/16	0.53
80350	2-3/16	0.54	80371	2-1/4	0.53	80396	2-1/8	0.52
80351	2-3/8	0.53	80372	2-1/4	0.55	80397	2-3/16	0.54
80352	2-1/8	0.56	80373	2-3/16	0.54	80398	2-1/8	0.56
80353	2-3/16	0.54	80374	2-3/16	0.53	80399	2-3/16	0.56
80354	2-1/4	0.52	80375	2-3/16	0.56	80400	2-3/16	0.54
80355	Broke	0.53	80376	2-3/16	0.52	80401	2-3/16	0.53
Retest	2-3/16		80377	2-1/8	0.55	80402	2-1/16	0.55
"	2-3/8		80378	2-1/8	0.53	80403	2	0.53
80356	2-1/8	0.53	80379	2-1/4	0.53	80404	2-1/8	0.56
80357	2-1/4	0.55	80380	2-5/16	0.54	80405	2-3/8	0.53
80358	2-1/2	0.54	80381	2-3/16	0.53	80406	2-1/8	0.53
80359	2-1/4	0.53	80382	2-1/4	0.53	80407	2-3/16	0.54
80360	3-1/8	0.52	80383	2-1/4	0.55	80408	2-1/4	0.56
80409	2-5/16	0.55	80421	2-3/16	0.56	80432	2-3/16	0.56
80410	2-5/16	0.54	80422	2-5/16	0.56	80433	2-1/4	0.55
80411	2-5/16	0.50	80423			80434		
80412	2-3/16	0.56	80424			80435		
80413	2-1/16	0.55	80425	2-5/16	0.54	80436	2-3/16	0.56
80414	2-1/8	0.54	80426	2-3/16	0.53	80437	2-1/4	0.56
80415	2	0.57	80427	2-5/16	0.53	80338	2-1/8	0.53
80416	2-1/16	0.57	80428	2-1/8	0.54	80339		
80417	2-1/8	0.56	80429			80340	2-1/16	0.53
80418			80430	2-1/4	0.53	80341	2-1/4	0.55
80419	2-5/16	0.53	80431	2-3/16	0.55	80342	2-5/16	0.53
80420	2-1/8	0.54						

AVERAGE ANALYSIS.

Silicon	Phosphorus	Manganese	Carbon	Sulphur–June 29th, 1907.
0.05	0.078	0.90	0.54	0.072
0.04	0.068	0.92	0.54	0.069

Heat No.	Defl;	Car	Heat No.	Defl;	Car.	Heat No.	Defl;	Car.
84441	2-5/8	0.52	84473	2-5/16	0.54	84503	2-3/8	0.53
84442	2-1/4	0.54	84474	Broke	0.50	84504	2-3/16	0.54
84443	2-3/8	0.54	Retest	2-7/16		84505	2-1/4	0.50
84444	2-5/8	0.55	"	2-9/16		84506	2-3/8	0.52
84445	2-1/4	0.53	84475	2-1/2	0.53	84507	2-1/4	0.56
84446	2-1/2	0.56	84476	2-5/8	0.51	84508	2-1/2	0.51
84447	2-1/4	0.51	84477	2-7/16	0.53	84509	9/16	0.50
84448	2-5/16	0.50	84478	2-5/8	0.50	84510	2-1/2	0.56
84449	2-5/16	0.53	84479	2-1/2	0.51	84511	2-9/16	0.50
84450	2-1/2	0.51	84480	2-1/4	0.53	84512	2-3/8	0.50
84451	2-1/2	0.53	84481	2-1/2	0.55	84513	2-1/2	0.51
84452	2-1/2	0.50	84482	2-5/8	0.53	84514	2-5/8	0.53
84453	2-5/8	0.54	84483	2-7/16	0.50	84515	2-3/8	0.54
84454	2-3/8	0.52	84484	2-1/4	0.52	84516	2-1/2	0.50
84455	2-1/4	0.51	84485	2-3/4	0.50	84517	2-5/16	0.56
84456	2-3/4	0.50	84486	2-3/4	0.52	84518	2-7/16	0.50
84457	2-5/8	0.53	84487	2-5/8	0.54	84519	2-5/8	0.51
84458	2-1/2	0.54	84488	2-3/8	0.53	84520	2-1/2	0.50
84459	2-1/2	0.51	84489	2-9/16	0.50	84521	2-3/8	0.54
84460	2-1/2	0.53	84490	2-1/2	0.51	84522	2-5/8	0.53
84461	2-3/8	0.50	84491	2-1/2	0.53	84523	2-3/4	0.56
84462	2-1/4	0.56	84492	2-1/2	0.52	84524	2-3/8	0.53
84463	2-5/8	0.53	84493	2-1/2	0.50	84525	2-3/8	0.55
84464	2-1/8	0.53	84494	2-3/8	0.51	84526	2-1/2	0.51
84465	2-3/8	0.50	84495	2-1/4	0.53	84527	2-9/16	0.51
84466	2-3/16	0.54	84496	2-1/2	0.50	84528	2-1/2	0.53
84467	2-1/4	0.52	84497	2	0.52	84529	2-3/16	0.54
84468	2-1/2	0.51	84498	2-1/2	0.54	84530	2-3/16	0.54
84469	2-1/2	0.53	84499	2-1/2	0.51	84531	2-5/16	0.50
84470	2-3/4	0.50	84500	2-7/16	0.50	84532	2-5/8	0.53
84471	2-3/8	0.53	84501	2-3/8	0.55			
84472	2-1/2	0.51	84502	2-3/8	0.54			

AVERAGE ANALYSIS.

Silicon	Phosphorus	Manganese	Carbon	Sulphur–Sept. 11th, 1907.
0.04	0.078	0.91	0.523	0.075

REPORT OF TESTS ON RAILS MADE IN 23 PASSES.

Heat No.	Defl;	Car.	Heat No.	Defl;	Car.	Heat No.	Defl;	Car.
58970	Broke	0.50	58975	1.7	0.50	58982		0.50
Retest	1.4		58976		0.52	58983		0.49
"	1.7		58977		0.49	58984		0.49
58971		0.49	58978		0.49	58985	1.7	0.50
58972		0.50	58979		0.50	58986		0.49
58973		0.51	58980	1.7	0.49	58987		0.50
58974		0.50	58981		0.51	58988		0.51

AVERAGE ANALYSIS.

Silicon	Phosphorus	Manganese	Carbon	Sulphur	
0.079	0.089	0.99	0.50	0.060	May 28th, 1907.

Heat No.	Defl;	Car.	Heat No.	Defl;	Car.	Heat No.	Defl;	Car.
58989		0.50	59026		0.49	59062		0.51
58990	1 6	0.49	59027		0.50	59063		0.52
58991		0.49	59028		0.50	59064		0.51
58992		0.49	59029		0.51	59065	1.5	0.50
58993		0.50	59030	1.5	0.52	59066		0.49
58994		0.50	59031		0.52	59067		0.50
58995	1.5	0.51	59032		0.52	59068		0.51
58996		0.50	59033		0.51	59069		0.51
58997		0.49	59034		0.52	59070	1.6	0.52
58998		0.50	59035	1.6	0.51	59071		0.52
58999		0.50	59036		0.51	59072		0.51
59000	1.7	0.51	59037		0.52	59073		0.50
59001		0.51	59038		0.52	59074		0.49
59002		0.52	59039		0.52	59075	1.5	0.50
59003		0.51	59040	1.4	0.51	59076		0.51
59004		0.50	59041		0.50	59077		0.51
59005	1.6	0.50	59042		0.49	59078		0.52
59006		0.49	59043		0.50	59079		0.52
59007		0.49	59044		0.51	59080	1.6	0.51
59008		0.50	59045	1.5	0.50	59081		0.50
59009		0.50	59046		0.50	59082		0.49
59010	1.5	0.49	59047		0.49	59083		0.49
59011		0.50	59048		0.50	59084		0.50
59012		0.50	59049		0.51	59085	1.5	0.51
59013		0.50	59050	1.7	0.51	59086		0.52
59014		0.50	59051		0.50	59087		0.52
59015	1.5	0.50	59052		0.50	59088		0.51
59016		0.50	59053		0.52	59089		0.51
59017		0.51	59054		0.52	59090	1.4	0.52
59018		0.51	59055	1.5	0.51	59091		0.51
59019		0.52	59056		0.50	59092		0.51
59020	1.6	0.51	59057		0.50	59093		0.50
59021		0.52	59058		0.49	59094		0.49
59022		0.52	59059		0.49	59095	1.6	0.50
59023		0.51	59060	1.6	0.50	59096		0.51
59024	1.5	0.51	59061		0.51	59097		0.52
59025	1.5	0.50				59100	1.6	0.51

AVERAGE ANALYSIS.

Silicon	Phosphorus	Manganese	Carbon	Sulphur–May 29th, 1907.
0.101	0.085	0.95	0.50	0.061

Heat No.	Defl;	Car.	Heat No.	Defl;	Car.	Heat No.	Defl;	Car.
59101		0.51	59112		0.51	59121		0.51
59102		0.50	59113		0.51	59122		0.50
59103		0.50	59114		0.52	59123		0.51
59104		0.52	59115	1.8	0.50	59124		0.51
59105	1.5	0.51	59116		0.52	59125	1.6	0.50
59106		0.51	59117		0.51	59126		0.52
59107		0.51	59118		0.51	59127		0.51
59108		0.52	59119		0.51	59128		0.51
59109		0.51	59120	Broke	0.52	59129		0.52
59110	1.7	0.50	Retest	1.5		59130	1.5	0.50
59111		0.50	"	1.4				

AVERAGE ANALYSIS.

Silicon	Phosphorus	Manganese	Carbon	Sulphur–May 30th, 1907.
0.102	0.082	0.96	0.51	0.060

Heat No.	Defl;	Car	Heat No.	Defl;	Car.	Heat No.	Defl;	Car.
64309	1.4	0.52	64324	Broke	0.50	64337	1.6	0.51
64310	1.5	0.50	Retest	1.6		64338	1.5	0.51
64311	Broke	0.51	"	1.6		64339	1.5	0.50
Retest	1.6		64325	1.3	0.52	64340	1.4	0.51
"	1.6		64326	1.1.4	0.50	64341	1.7	0.50
64312	1.5	0.51	64327	1.3	0.50	64342	1.6	0.51
64313	1.5	0.50	64328	Broke	0.50	64343	Broke	0.51
64314	1.5	0.50	Retest	1.6		Retest	1.6	
64315	Rejct'd	0.50	"	1.7		"	1.6	
64316	1.6	0.52	64329	1.5	0.50	64344	1.7	0.51
64317	1.6	0.52	64330	1.5	0.51	64345	1.6	0.51
64318	1.3	0.52	64331	1.4		64346	1.6	0.51
64319	1.4	0.51	64332	1.3	0.51	64347	1.6	0.52
64320	1.6	0.50	64333	1.3	0.52	64348	1.5	0.51
64321	1.5	0.51	64334	1.4	0.52	64349	1.4	0.51
64322	1.4	0.50	64335	1.3	0.52	64350	1.7	0.50
64323	1.4	0.51	64336	1.5	0.51	64351	1.8	0.51
						64352	1.6	0.51

AVERAGE ANALYSIS.

Silicon	Phosphorus	Manganese	Carbon	Sulphur–Aug. 5th, 1907.
0.102	0.086	0.93	0.51	0.049

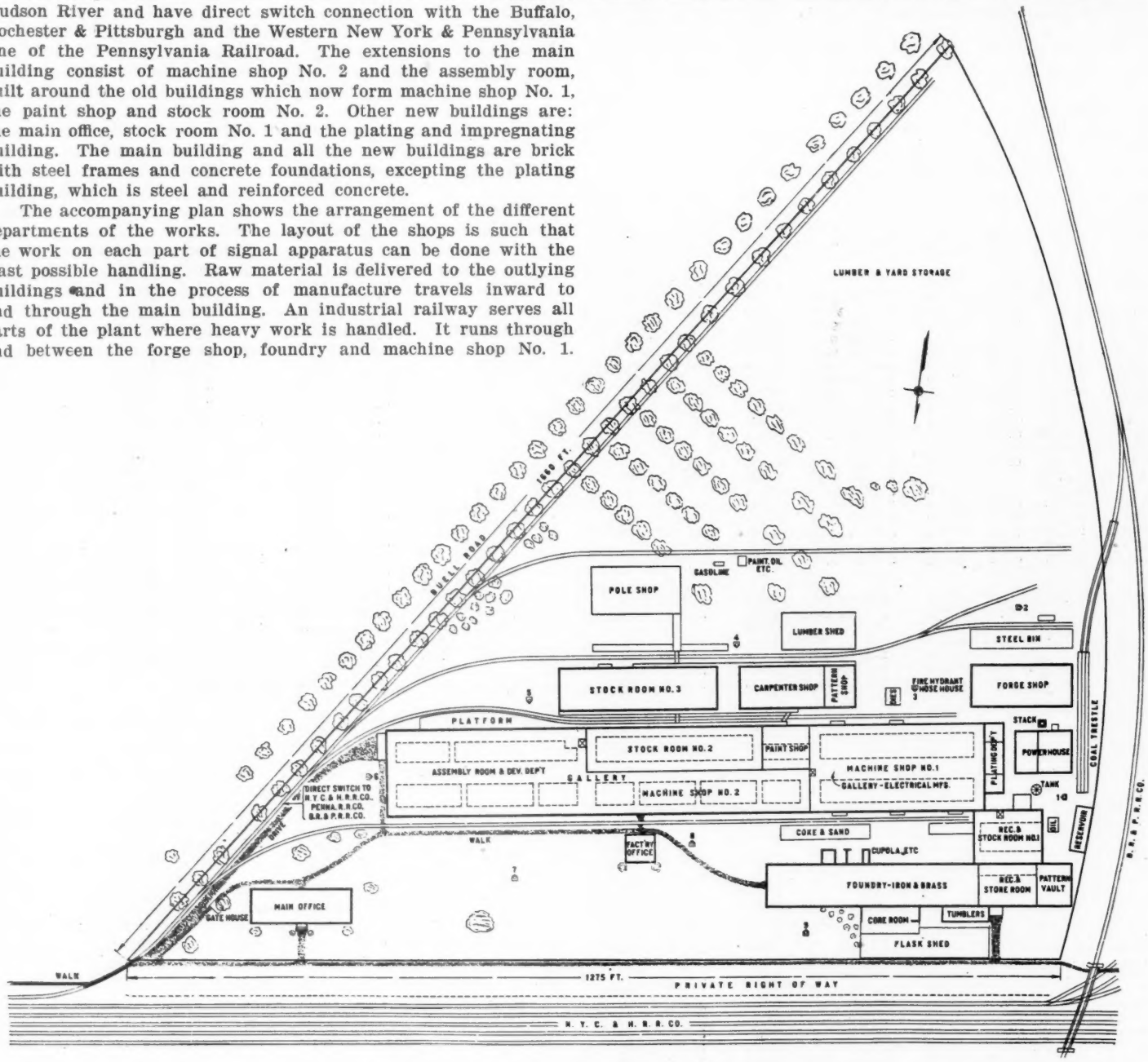
Results of Drop Tests of Rails Made in 23 Passes, Compared With 20 Passes.

The Enlarged Shops of the General Railway Signal Company.

The General Railway Signal Company was formed in 1904, and acquired the Taylor Signal Company, Buffalo, N. Y., and the Pneumatic Signal Company, Rochester, N. Y. A year ago the company decided to combine the two plants on the 25 acres of land owned at Rochester. Accordingly, the Buffalo property has been sold and the Rochester shops enlarged to make room for the machinery bought from Buffalo.

The shops are on the main line of the New York Central & Hudson River and have direct switch connection with the Buffalo, Rochester & Pittsburgh and the Western New York & Pennsylvania line of the Pennsylvania Railroad. The extensions to the main building consist of machine shop No. 2 and the assembly room, built around the old buildings which now form machine shop No. 1, the paint shop and stock room No. 2. Other new buildings are: the main office, stock room No. 1 and the plating and impregnating building. The main building and all the new buildings are brick with steel frames and concrete foundations, excepting the plating building, which is steel and reinforced concrete.

The accompanying plan shows the arrangement of the different departments of the works. The layout of the shops is such that the work on each part of signal apparatus can be done with the least possible handling. Raw material is delivered to the outlying buildings and in the process of manufacture travels inward to and through the main building. An industrial railway serves all parts of the plant where heavy work is handled. It runs through and between the forge shop, foundry and machine shop No. 1.



Rochester Shops of the General Railway Signal Company.

Material for foundry work and immediate use in the machine shop is brought in on the spur nearest the New York Central tracks. Metal for the foundry is delivered directly to that building, while steel bars and similar partly finished material goes into stock room No. 1. The store room adjoining the foundry is for rough castings. From these two rooms the work is carried into machine shop No. 1. Similarly, on the other side of the plant, lumber, and the steel for the forge shop are brought, respectively, to the carpenter shop and the steel bin. The rough forgings then also go into machine shop No. 1.

The main building is two stories high, the second story consisting of galleries running around the sides and down the middle. All heavy work remains on the ground floor throughout its progress toward the assembly room, while the lighter work remains in the galleries; thus no work has to be lifted to a higher level except at the start, when the material for lighter work coming from the forge, foundry and stock room No. 1 is raised to the gallery on an elevator in machine shop No. 1. On the ground floor of this shop the machinery is along two aisles; the planers and millers for work on heavy castings are on the side nearest the foundry and the heavy lathes used for forgings are on the opposite side, while the comparatively light work is done in the middle. The work in the galleries of this shop is mostly winding of armatures and magnets and machine work on small parts. At the rear of the large machine shop is the plating department. Electro plating is done on the first floor and on the second coils are impregnated with the insulating compound.

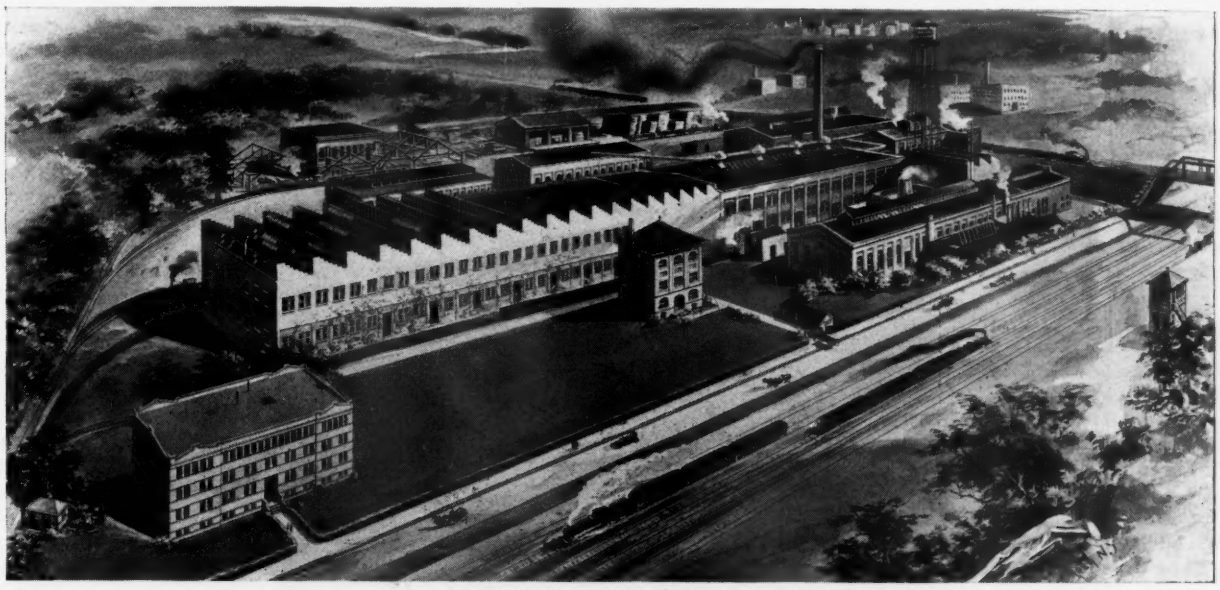
Before going to the assembly room, most of the work, particularly the castings, passes through the paint shop; those parts that are already finished go into stock room No. 2, while others go into machine shop No. 2. On the ground floor of this shop the heavy parts are finished. This work consists mostly of boring, reaming and tapping, so that everything is ready for the final assembling. Here, also, is the punching department, where laminated armature cores are made. The galleries of machine shop No. 2 are really the assembling department for the lighter parts which come from the galleries of machine shop No. 1. The final assembling of light parts is done in the galleries of the assembly room and these parts are then taken down to the first floor, where the heavy parts are being assembled, and there attached. The experimental and developing departments, the tool making department, and a testing department are also in the galleries of the assembly room. The finished machines and parts are taken from the ground floor of the assembly room into stock room No. 2 and stock room No. 3, or are loaded directly into the cars. Stock room No. 2 is also used as a store room for finished parts waiting to be assembled; No. 3 is particularly for finished repair parts. As shown in the plan, shipping platforms extend along almost the entire length of the main building and on the other side of the track along stock room No. 3 and the carpenter shop, so that there is room to load 27 freight cars simultaneously.

Motor drive is used throughout the shops, most of the tools

being driven in groups. The power house is equipped with four Babcock & Wilcox 200-h.p. boilers. A 200-k.w. generator is driven by a Skinner-Corliss engine; a 150-k.w. generator by a Westinghouse vertical compound engine, and a 20-k.w. generator by a Buffalo Forge Co. vertical engine. A Chicago Pneumatic Tool Co. air compressor, with a capacity of 809 cu. ft. of free air per minute, supplies air for pneumatic tools. The old buildings were formerly heated with direct live steam, but direct exhaust steam is now used. In the new buildings the ventilation and heating are combined in a system developed by the contractors; the exhaust steam is carried from the power house to separate heating stacks for each building, the heated air being circulated by motor-driven fans.

Work on the improvements was started last January and the buildings were finished before the removal of machinery from Buffalo began. This transfer of machinery had to go on without interrupting production, so it was done piecemeal. The work done by each Buffalo machine was rushed for a few days before its removal so as to leave enough behind it for other machines to work on until it was in operation again at Rochester. In some cases, of course, other machines could be put on the work ordinarily done by the machine which was in transit. The last piece of machinery was transferred about three weeks ago.

The erection of the new buildings and the moving and reinstalment of the Buffalo equipment were carried out by Westinghouse, Church, Kerr & Co., New York. H. O. Pond was Engineer in Charge.



Rochester Shops of the General Railway Signal Company.

Ocean Rates on Grain.

The following table, from the *Monthly Summary of Commerce and Finance*, published by the Department of Commerce and Labor, shows the mean ocean freight rates on grain from the United States to six leading destinations in Europe for the three months ending November 30, 1905-1907.

(Cents per 100 lbs.)

Ports.	Three months ending Nov. 30— 1905.	1906.	1907.
To Liverpool, from—			
Boston	8.34	5.25	7.06
New York	8.60	5.08	7.24
Baltimore	8.78	6.43	8.30
New Orleans	13.20	12.32	*10.93
To Hamburg, from—			
Boston	13.09	11.78	10.06
New York	13.98	8.45	9.15
Baltimore	11.38	9.16	9.97
New Orleans	14.69	13.14	*12.93
To Rotterdam, from—			
New York	12.21	7.66	9.85
Baltimore	10.92	9.99	10.75
New Orleans	14.44	12.96	*12.54
To Copenhagen, from—			
Boston	12.84	9.79	14.88
New York	15.58	9.11	12.95
Baltimore	.....	.....	12.38
New Orleans	16.03	14.41	*15.82
To Marseilles, from—			
New York	16.76	14.10	12.49
New Orleans	18.77	18.20	*18.38
To "Cork for orders," from—			
New York (nominal)	14.38	12.67	12.17
Baltimore	15.00	11.58	12.05
Portland, Ore.	29.00	29.46	30.43
Seattle and Tacoma	27.96	28.06	32.29

*Mean, Sept. 1 to Nov. 20, 1907, inclusive.

The south island of New Zealand, which is about 500 miles long from northeast to southwest, is divided by a lofty range of mountains generally not far from the west coast, while the chief population is between the mountains and the east coast. Communication between leading ports on the two coasts, only 100 miles apart, is now made by sailing half way around the island, some 600 miles, though the railroad termini on the two sides of the pass are not 40 miles apart. The colony has recently contracted with Murdoch McLean to make a tunnel 5¼ miles long through the range at Arthur Pass, through which the railroad will be extended. It is expected to be five or six years before the tunnel is finished. It will cost about $2,400,000.

The Organization and Working of Wrecking Outfits.*

The committee believes that the wrecking crews should be in charge of the mechanical and car department, as men employed in these departments are more able to handle derailed and wrecked engines and cars than other classes of railroad employees. The wrecking crews when out on the road and at wrecks should be under the authority of the superintendent of the division the wreck is on. Co-operation of the employees and heads of different departments are needed to facilitate the clearing of wrecks and repairing the damaged track, in order to reopen the road for traffic as quickly as existing conditions will permit.

At each division headquarters on busy lines where traffic is heavy and fast, a wrecking outfit and crew should be located. Such outfit should consist of a 50 to 100-ton steam wrecking derrick, a tool car to contain all necessary tools and blockings, a car for track material, a car for extra trucks, and a commissary car supplied with a cook stove.

The wrecking outfit should be in charge of a good wrecking master and 10 competent car repairers. The steam derrick should be in charge of a good engineer and fireman. At a wreck, in addition to these two men a good reliable man should be stationed on the steam derrick to take the orders and signals from the wrecking master and give them to the engineer, as the latter cannot hear the orders and see the signals given by the wrecking master and attend to the swinging of the boom and other work on the derrick.

The derrick and cars belonging to the wrecking outfit should be placed on a special track at division headquarters—a track that at no time will be blocked, but that can be approached at all times quickly with an engine, so there will be no delay caused at the starting point by not getting the wrecking outfit ready to start on short notice.

In order to always have the proper force ready for the wrecking crew, the master wrecking foreman, as well as the men needed for assistance, should be employed in the car department at their shops or repair yards. The engineer and fireman for the derrick should be employed either at the engine house or machine shop, in order that they can be called on short notice. During working hours the best method for calling wrecking crews is the shop whistle, which should be two long blasts, so it can be distinguished from any other use of the whistle. After working hours and at nights the crew should be called by telephone, electric bells or swift callers.

The wrecking train should be taken to the wreck by the first engine and train crew available.

For emergency use, a small supply of canned goods and coffee

*A committee report presented to the Chicago Convention of the Roadmasters' and Maintenance of Way Association.

should be kept in the commissary car, so that in serious wrecks the wrecking force can be supplied with lunch, until such time as the men can be conveniently spared to go to regular hotels for meals. If the roads are so located that hotels or eating houses are far apart, meals should be provided in the commissary cars for the wrecking crews.

The head of the track department and the section foreman of the division on which the wreck occurs should be advised by the train despatcher as promptly as possible of the nature of the wreck as reported to him by the train crew in charge of the wrecked train, so that the head of the track department can order to the wreck whatever track men may be needed to take care of the damaged track and give the wrecking crew what assistance they need.

The wrecking outfit should be provided with a good supply of different sized pine and oak blockings from 1 in. plank to 2, 3 and 6 in. thicknesses and from 24 to 36 in. long; also a supply of wooden wedges of different sizes. Four to six 20 to 50-ton jacks should be kept in the tool car. However, with a 75 to 100-ton steam wrecking derrick, jacks are not needed or used much, the derrick doing the work much quicker than jacks would.

Four ¾-in. x 15-ft. truck chains with a grab hook at each end and a ring in the center should be kept in the tool car. Two large and two small grab hooks to be used to turn over car frames and car bodies are a much needed article in connection with the steam wrecking derrick, since with a properly constructed grab hook attached to the cable of the steam wrecker and the hook properly placed, a box car body can be rolled over very quickly to clear obstructed tracks. At least 20 chains, including ⅝-in., ¾-in., ⅞-in. and 1-in. sizes, 15 ft. long, should be kept in the tool car to be used in chaining trucks to body of cars, and lifting and chaining cars together, where draft rigging and couplers are broken. In addition to these chains there should be at least six chains 1¼ in. in diameter and 20 ft. long for heavy lifts. There should be four wire cables 2 in. in diameter by 20 ft. long to roll and lift cars and engines. There should be at least four hemp ropes from 1 to 3 in. in diameter and from 200 to 300 ft. long, with the proper sized snatch blocks. There should be two guy anchors, four wrecking frogs, a good supply of tools such as sledges, chisels, hammers, wrenches, as may be needed to disconnect bent and twisted rods. There should be carried in the wrecking car a full set of track tools, such as claw bars, lining bars, spike mauls, track wrenches, track chisels, shovels, picks with handles and track gages for emergency cases. Scoop shovels and baskets and bags to handle and transfer grain.

The car with track material should be supplied with 20 rails, and the fastenings for same, of the pattern used on the main line, one switch complete, one right hand and one left hand spring frog of same angle used on main line, two guard rails, 100 to 150 ties, five kegs of spikes and two kegs of bolts.

The first aim in case of wrecks should be to clear the track and reopen it for traffic. After traffic is moving the wreck should be picked up, cars unfit for future use burned and scrap picked up as soon as possible, as portions of wrecked cars look very unsightly along railroad tracks.

Damaged freight should be reloaded and turned over to the claim department for adjustment. In serious accidents where a large amount of freight has been damaged or stock killed or injured, the claim department should be advised so they can have one of their agents at the wreck.

In passenger wrecks the first aim should be to take care of the injured persons. Medical assistance should be called from the nearest villages and cities, and every possible effort made to get physicians to the wreck as quickly as possible. The wrecking outfit should also be supplied with two or more stretchers and blankets to carry injured persons to a place of safety.

Two wrecks seldom occur alike. It therefore requires the best of judgment and mechanical skill to handle all wrecks with facility and promptness and reopen the blocked road with the least delay.

The report is signed by C. Buhrer, W. H. Kofmehl, A. Boydston and B. A. West.

William Bliss.

William Bliss.

William Bliss, President of the Boston & Albany, died last Saturday at his home in Boston. Mr. Bliss was the active head of this corporation for over a quarter of a century, but since the lease of the road to the New York Central & Hudson River his office was only a formality. He was born in Springfield, Mass., in 1834. He worked in a store there and later went to New York. In 1865 he was made Assistant to President C. W. Chapin, of the Western Railroad, who was his father-in-law, and the next year he was made General Freight Agent. In 1872, the road having been consolidated with the Boston & Worcester, Mr. Bliss was made General Manager of the new company, the Boston & Albany. In 1878 Mr. Chapin retired and was succeeded by Vice-President D. W. Lincoln, and Mr. Bliss became Vice-President, retaining the office of General Manager. In 1880 Mr. Lincoln was killed in an accident and Mr. Bliss succeeded him. During the 20 years of his active work as President, he was always in close personal touch with every department of the road. He was just and considerate in his treatment of employees and they in turn were loyal to him and the road. During the panic of 1893 he insisted on paying wages in cash in spite of the example of many large roads which used checks or scrip. Like many railroad men of a quarter of a century ago, his jealousy of the independence of his road made him particularly conservative in establishing relations with connecting lines. The Boston & Albany was, however, always connected with the New York Central (of which Mr. Bliss was a director) and the lease, seven years ago, was a natural development. This spirit of independence in traffic relations was in large degree a concession to public sentiment, which, in Massachusetts, was almost synonymous with stockholders' sentiment. It by no means meant a paucity of the spirit of enterprise, however, and in some important respects the Boston & Albany was a leader. Its track was early put in the front rank, as Mr. Dudley's records, published in the *Railroad Gazette*, will show; and the company was one of the first to pay premiums to roadmasters and foremen. Structural economy and taste in design of passenger cars was a noticeable feature of the service of the road, and station buildings of real architectural character, surrounded by grounds laid out by competent landscape gardeners, in sympathy with the architect, were common on this road when few others had even begun to deal systematically with aesthetics. In all these features Mr. Bliss was the moving spirit.

Railroads in Venezuela.

Venezuela has 13 railroads, the longest 111 miles long, and no other as much as 50. They are for the most part lines which climb the hills from the sea towards the interior, and have steep grades. On one line for 2½ miles there is a grade of 449 ft. per mile, worked by the cog-wheel system, and there are other grades of 213 ft., 185 ft. and 158 ft. Few of the lines connect with others, and there is a menagerie of gages. About half the mileage is of 42-in. gage, nearly a quarter of 36-in., a fifth of 24-in. and a little of meter gage and one of 25-in. The longest line is a German enterprise. Almost all the rolling stock was built in the United States. The aggregate length June 30, 1906, was 523 miles, and the gross earnings were at the average rate of $3,515 per mile; the net, one-third as much.

Proposed Rules for Interchange of Cars in Europe.*

At a meeting of the International Conference of the Union for the Standardizing of Railways held at Berne, Switzerland, May 6 to 18, 1907, a code of rules governing the interchange of cars between countries in Europe was drawn up to be submitted to the 17 states represented in the conference for adoption. A limited code of rules specifying the standard gage of track and a few requirements in the matter of construction of interchange rolling stock has been in force since 1886. A customs agreement covering the movement of goods in bond has also been in force since 1886. These two codes, somewhat modified, have been combined and expanded by the addition of rules dealing with the maintenance of cars and methods of loading. The Conference discussed the advisability of adopting automatic couplers and continuous train brakes on all freight cars but no action was taken. It concluded that as yet no existing pattern of automatic coupler had been proved, by sufficiently prolonged trial, to satisfy all requirements, and that, therefore, it was not yet necessary to propose that the European railroads should give up the coupling systems at present in use. It decided that the time had not yet come to arrive at any definite conclusion as regards any such coupler.

The proposed rules covering the maintenance of rolling stock and loading of cars are given below:

1. Cars used for international traffic must be kept in a proper state of maintenance so as in no manner to imperil the safety of the working. If that is not the case, more especially, if the cars do not satisfy the conditions specified under Secs. 2 to 4, or if they show one of the defects enumerated under Sec. 5, they can be refused.

2. When a car passes over on to the system of an adjoining country, the time which has elapsed since the last general overhaul must not exceed three years. All cars, however, whether loaded or not, still capable of running and returning to their home country, must be accepted by the management of intermediate lines, even if a longer time has elapsed.

3. The axle-boxes must be filled with suitable lubricating material. Cars with periodical lubrication, if the period of lubrication has elapsed, may not leave the railroad owning them without fresh lubrication.

4. Wagons used for the transportation of cattle must be returned perfectly cleaned and disinfected.

5. DEFECTS JUSTIFYING REFUSAL:

A.—Defects in the Wheels and Axles.—1. Wheels showing any signs of having shifted on their axle.

2. Wheels having their center cracked without being loose.

3. Wheels with their rims broken across and having tires less than $1^{3}/_{16}$-in. thick at the rolling circle. Any commencing fractures at the rim, are not causes for refusal.

4. Wheels having a spoke broken across, or more than one spoke cracked, and wheels with cast-iron centers in which the majority of the spokes are out of true.

5. Solid wheels having a circular crack extending over more than one-fifth of the circle in which they are located, or having more than two radial cracks.

6. Cast-iron wheels without tires, showing any cracks. Slight lines on the tread, as well as unimportant defects in the body of the wheels resulting from the operation of casting, are not causes for refusal.

7. Wheels having flanges less than $^{25}/_{32}$-in. thick at the points where they touch the rails; wheels having a cutting flange, that is to say when there has been so much wear that a sharp edge has been formed. In the case of cars with three axles, the thickness of the flanges of the middle wheels is not taken into consideration.

8. Wheels with treads showing flats worn down more than $^{2}/_{16}$-in.

9. Wheels with tires which are crushed, broken, cracked across or cracked along the circumference.

10. Wheels with separate tires, when:

(*a*) The tires are loose or show signs of lateral displacement;

(*b*) More than two of the bolts, screws or rivets fixing the tire to the rim are broken, displaced or lost;

(*c*) If secured by means of Mansell rigs: When the sides or even the treads themselves show cracks more than $3^{15}/_{16}$-in. long, or when more than two of the bolts securing the rings are broken.

11. Axles out of true or showing cracks or commencing fractures.

12. Axles on which the draw-rods of brakes or other parts rub. If the rubbing pieces can be removed and if the wear does not extend deeper than $^{3}/_{32}$-in. ($^{3}/_{16}$-in. on the diameter) and there are no sharp corners, the car must be accepted.

B.—Defects in the Axle-Boxes and Bearings.—1. Axle-boxes so damaged that they cannot guide the axle properly or cannot hold the lubricating material.

2. Bearings which have become seriously heated.

C.—Defects in the Bearing Springs.—1. Displacement of more than $^{25}/_{32}$-in. of a spring or of its back plate relatively to the axle-box when the distance between the axles furthest apart does not exceed 14 ft. 9⅛ in., and of more than $^{2}/_{16}$-in. when that distance is greater.

2. Fracture of the back plate of a bearing spring.

3. Fracture of an intermediate plate near the middle, in the case of passenger cars; and fracture of two or more intermediate plates near the middle, in the case of freight cars.

4. Fracture of a helical spring not kept in position by a stop or a bolt passing through it..

5. Absence or fracture of the parts necessary to fix the springs.

6. Body or sole bars of underframe bearing on the buckle of the bearing spring, rubbing against the wheels, or showing recent traces of such contacts. Old traces of former contacts or the contact of safety supports with the outer fourths of the length of the spring do not justify refusal.

N. B.—Cars in which the distance between the axles furthest apart does not exceed 14 ft. 9⅛ in., and returning, empty, to the system owning them, must be accepted if they have the defects specified under paragraphs 2 to 6, provided that they are suitably and firmly secured.

D.—Defects in the Buffing Gear.—1. Rods or springs of buffers broken or damaged so as to prevent the buffers from working.

2. Absence of the parts which prevent the buffers from dropping.

3. Buffer boxes broken or missing. Buffer boxes, which, although damaged, still support and guide the buffers sufficiently, are not causes for refusal.

N. B.—Cars returning empty to the system owning them, must be accepted if they have the defects specified under paragraphs 1 to 3, if they can run without danger at the tail end of a train.

E.—Defects in the Draw-Gear.—1. Chief couplings or safety couplings or chains broken, draw-hooks broken or showing signs of fracture when the regulation coupling up with other cars (including both the chief coupling and the safety coupling) becomes impossible.

2. Drawbars, pins and guides broken or showing signs of fracture.

3. Absence of safety chains or of safety couplings in the case of cars not equipped so that the two chief couplings of the two cars in contact can be used simultaneously.

4. Helical drawsprings broken, or plate drawsprings with the back plate broken at any point, or one of the other plates broken near the middle.

N. B.—Cars returning empty to the system owning them, must be accepted if they have the defects specified under paragraphs 1 to 4, if they can run without danger at the tail end of a train.

F.—Defects in the Underframe and Body of Cars.—1. Axle-guards broken or cracked through more than one-third of their section, also displaced axle-guards, if they cannot be adjusted by tightening the bolts.

2. Sole bars, headstocks and any intermediate cross-framing in connection with the draw-gear, broken across.

3. Parts of the frame of the body broken right through, any damage at the doors, locks, sides of the body, flooring and roof, if such damage may result in the deterioration of the load or may endanger the safety of the working.

N. B.—Cars returning to the system owning them can only be refused on account of damage to the underframe, if running such cars would entail danger.

6. Cars with brakes which are damaged or do not act, cannot be refused, but they must bear conspicuous labels with very clear lettering stating that the car is not available for braking. Damaged or loose parts which might endanger the safety of working or cause other damage, must be taken off.

7. Empty returned cars must be accepted by the system owning them, no matter what their condition may be; in the case of cars which have been used for cattle, however, this acceptance is not compulsory until after the cars have been perfectly cleaned and disinfected.

LOADING OF WAGONS.

1. Wagons used for international traffic cannot be refused if the load is in a satisfactory condition which in no way can endanger the safety of working, and if it more particularly satisfies the following conditions:

2. The articles loaded on wagons must be arranged and stowed so that they cannot shift, even in case of shock or shaking.

3. The load must be distributed as equally as possible over all the wheels of the wagon, particularly as regards the end wheels. Wagons with the load so unequally distributed that the body or sole bars touch the buckles of the bearing springs, or that it makes them rub against the wheels can be refused.

4. The load in a wagon must not exceeed the load limit. When no load limit is inscribed on the wagon, an overload of 5 per cent. in addition to the normal load inscribed on the wagon, is allowed.

5. The weight per wagon wheel (the wheel load) must not exceed the maximum allowed on each line. The regulations of the managements of each line must be communicated to the States participating.

6. The load on open wagons must not project beyond the loading gage used on the different systems. The width of long loads must be reduced so as to allow for running round curves of small radius. The regulations of the management of each line must be communicated to the States participating.

7. The load on open wagons must not project beyond the head stock unless there is, between the load and the places of the buffers not compressed, a space of at least 1 ft. 3¾ in. up to 6 ft. 6¾ in. above rail level, and of at least 7⅞ in. higher up. Moreover, in order to allow coupling up to be effected, there must be a completely clear space at least 7⅞ in. in height above the drawhook, and at least 7⅞ in. wide on each side of the center line of the hook. If the load projects further beyond the headstock than here specified, a safety truck must be added.

8. For loading up long articles which cannot be carried on one single wagon, two wagons equipped with swing bolsters must be used. The wagons may be connected by screw couplings, by an iron coupler bar, or a wooden coupler bar properly strengthened by iron, by an intermediate truck connected with the two carrying wagons by coupler bars or couplings; or finally by the load itself if it can be used for the purpose and if each swing bolster is supporting a weight of at least 7.5 tons. The load must rest on the swing bolsters only; it must project beyond them at least $11^{13}/_{16}$ in., and at least 3 ft. 3⅝ in. if the load alone connects the wagons.

When any improvements or modifications in the preceding articles appear desirable, new conferences can be held, at the request of one of the states participating, the notices calling the meeting being issued by the Swiss Federal Council.

The states which have not yet adopted the rules of the union for the Standardizing of Railroads are at liberty to join the union. If so, they must give notice to the Federal Council, and the latter will inform the other states represented at the conference of the

*Abstracted from the August *Bulletin* of the International Railway Congress.

fact. By doing so, they become fully bound to observe all the rules, and entitled to all the advantages specified in those rules.

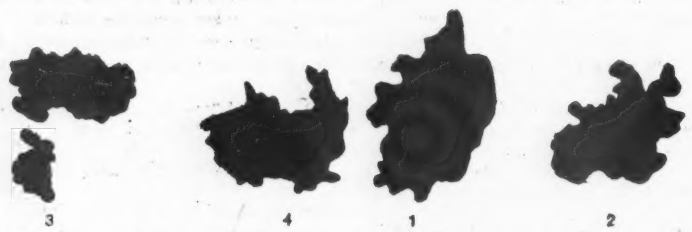
The governments concerned will inform the Federal Council before January 1, 1908, what determinations they have arrived at, with reference to the present rules. When the states have notified their determinations, and at the latest on February 1, 1908, the Swiss Federal Council will propose to the governments participating a date when the present rules are to come into force. Each signatory state has the right to withdraw from the union, subject to notice given by its government, six months in advance, to the Swiss Federal Council.

Areas of Contact Between Wheels and Rails.*

BY GEO. L. FOWLER.

(Reprinted from a Volume of Reports made to the Schoen Steel Wheel Co.)

The mutual compression between the wheel and the rail when under a load has an important bearing on the durability of both and also on the adhesion of the wheels when used as drivers. The investigation was made with various types of cars and locomotives to determine the area of contact between the wheel and the rail; the average pressure exerted per square inch over this area; the accumulated pressure at the center of this area; the yield of the metal in both the rail and the wheel under the imposed load; the relative action of the wheel and the rail under load; the comparative action of wheels of different diameters, and the comparative action of steel and cast-iron wheels.



Contacts of 35-inch Steel Tired Wheel Under Cafe Car. Weight on Wheel, 6,075 lbs.

Through the courtesy of Mr. J. F. Deems, General S. M. P. of the New York Central Lines, the preliminary work involving the use of cars and locomotives was done at the West Albany yards of the New York Central & Hudson River R. R. A concrete pier was built under one of the rails of a level piece of track to secure a firm foundation. A section about 10 in. long was cut out of the rail and a short piece with perfect contour was inserted on top of the pier. The car or locomotive, under which a wheel was to be examined, was run over this short section and one wheel allowed to rest upon it. The wheel was then raised with its mate so that the short section of rail could be removed and the top smeared with a thin coating of red lead. It was then replaced and the wheel lowered until it rested on the rail with its whole load. This made a spot on the red lead the size of the area of contact of the wheel and the rail. The wheel was again raised, the section of the rail removed, and the area of contact, as indicated by the spot on the red lead, transferred to tracing cloth. The rail was again smeared and replaced, and the wheel was turned through one-quarter of a revolution and the work repeated.

In the supplementary work in the laboratory, a section of a 78-in. tire, a section of a steel wheel and a section of a cast-iron wheel were used. One of these sections was fastened to the plunger of the testing machine and was raised and lowered on the heads of short sections of rails resting on the platen of the testing machine. The size and shape of the contact area was obtained by the interposition of a piece of white tissue paper resting on a sheet of carbon paper which made the imprint on the white paper.

The tests at West Albany were made with three cars and two locomotives. In all, 32 contacts were obtained, and plaster of Paris casts were taken of the treads of the wheels at all points at which the contact areas were obtained. Some of the wheels were new, while others were partly worn, a condition that evidently had much to do with the shape and size of the spot.

These areas were carefully measured with a planimeter and gave the following average results:

Wheels used under—	Total weight on wheels in lbs.	Average of area contact.	Average weight per sq. in. of area in lbs.
Café car (35 in.)	6,075	.2325	28,700
Gondola (33 in.)	14,575	.3775	40,100
Consolidation drivers (63 in.)	17,325	.3350	52,080
Atlantic driver (78 in.)	19,995	.6325	31,820
Atlantic trailer (48⅝ in.)	19,210	.4725	44,400
Dining car (34½ in.)	9,415	.2600	37,870

In these tests, the influence of weight and diameter is partially illustrated. The two wheels of the Atlantic engine, for example, carry about the same weight. The areas of contact are nearly in an inverse ratio to the diameters. Comparing the wheels of the cafe and dining cars, the wheel with the heavier load has much the greater weight per square inch of area, showing that the metal does not yield in direct proportion to the weight, at least within the limits of the loads here imposed.

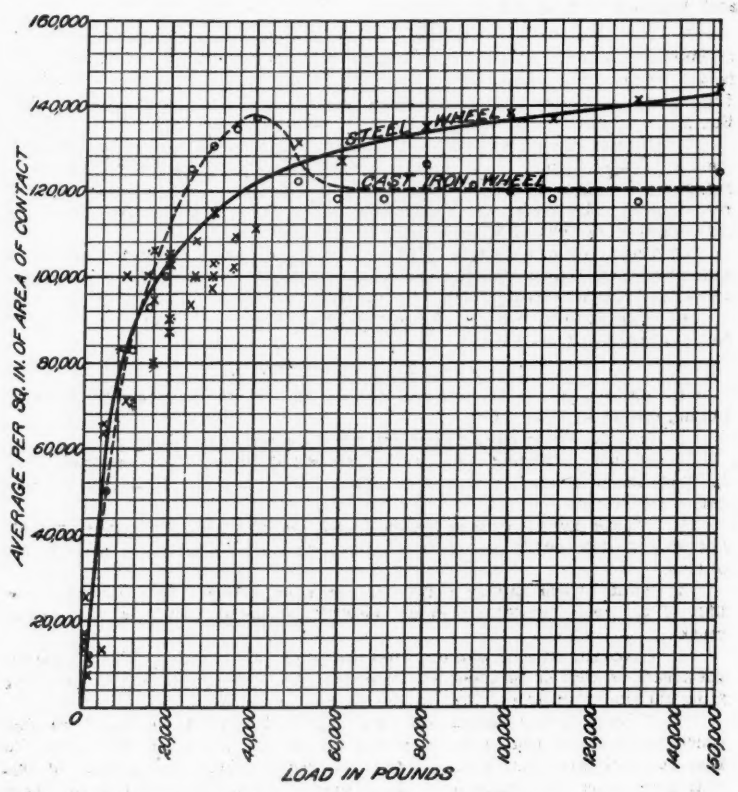


Diagram Showing the Relation Between Weights on Wheels and That on the Area of Contact Between the Wheel and the Rail.

In the laboratory, the first series of tests made was to apply pressures, increasing by small increments, to the tread of a 36-in. steel wheel resting on an 80-lb. rail. The lowest load applied was 500 lbs. This was increased by increments of 500 lbs. up to 20,000 lbs.; then by increments of 1,000 lbs. up to 30,000 lbs.

The second series was made with the same wheel resting on a 100-lb. rail, starting at a load of 500 lbs. and increasing by increments of 500 lbs. up to 2,000 lbs.; then by increments of 1,000 lbs. up to 10,000 lbs.; then by increments of 2,000 lbs. up to 30,000 lbs.

The third series was made with a 78-in. tire on a 80-lb. rail, starting at 500 lbs. and then increasing by increments of 500 lbs. to 2,000 lbs.; then by increments of 1,000 lbs. to 8,000 lbs.; then by 2,000 lbs. to 30,000 lbs. and from that point by increments of 2,500 lbs. to 40,000 lbs.

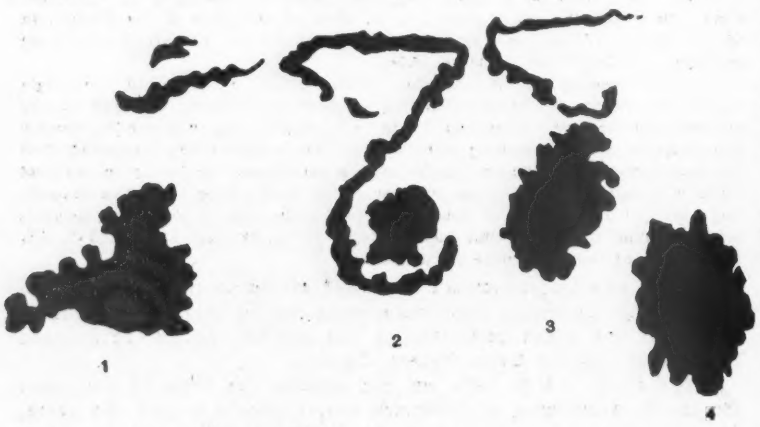
The fourth series was made with the 78-in. tire on a 100-lb. rail starting at 500 lbs. and increasing by increments of 500 lbs. to 2,000 lbs.; then by 1,000 lbs. to 8,000 lbs.; then by 2,000 lbs. to 30,000 lbs., and finally by 2,500 lbs. to 35,000 lbs.

The fifth series was made with the section of a cast-iron wheel 33 in. in diameter. This was tested on a 100-lb. rail only, starting at 500 lbs.; increasing by 500 lbs. increments to 20,000 lbs.; then by 1,000 lbs. to 30,000 lbs.; then by 2,500 lbs. to 40,000 lbs.; then by 5,000 lbs. to 150,000 lbs.

The sixth series was made with a 36-in. steel wheel on a 100-lb. rail and started at a load of 50,000 lbs. which was increased by increments of 10,000 lbs. to 150,000 lbs.

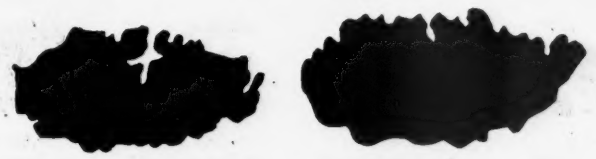
The results obtained from these tests have been plotted on the

*Copyrighted by the Schoen Steel Wheel Co., and published by special permission.



Contacts of 33-inch Worn Cast Iron Wheel Under Gondola Car. Weight on Wheel 14,575 lbs.

accompanying diagram and average lines drawn which show the accumulated pressure per square inch of area under the actual loads imposed, the lines being an average of the results obtained. It will be seen, on comparing the lines of the 36-in. steel wheel and of the 33-in. cast-iron wheel, that there is comparatively little difference up to a load of 22,500 lbs. after which the load per square inch increases more rapidly with the cast-iron wheel than with the steel wheel. At a load of 37,500 lbs. there is a marked breaking



1 2

Contacts of 78-inch Steel Tired Driving Wheel, Atlantic Locomotive. Weight on Wheel 19,995 lbs.

down of the metal in the cast-iron wheel showing that the crushing strength has been exceeded.

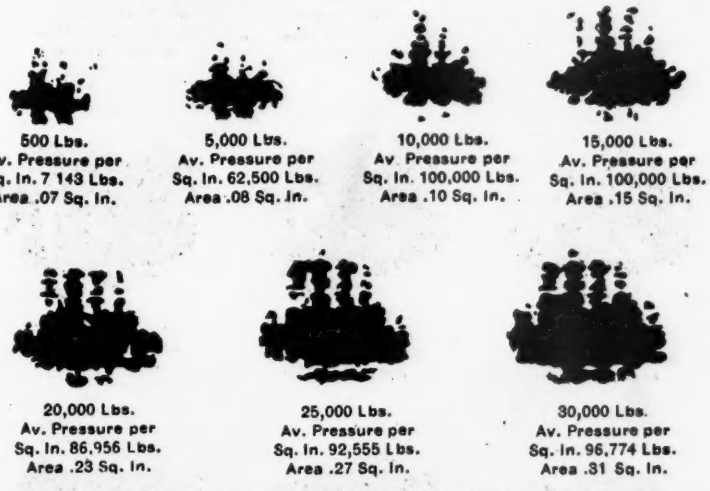
A tentative explanation of this phenomenon is that the hard chilled cast-iron wheel is practically unyielding and that, when the load is imposed, the whole of the compression takes place in the rail. The area of contact is small and the average pressure per square inch of area is high. The yield in the rail holds, for a time, against the increasing load, thus cutting down the size of the area between 22,500 lbs. and 40,000 lbs. The wheel itself then takes a permanent set, increasing the area of contact very rapidly and lowering the average. In the case of the steel wheel, yielding takes place in both the wheel and the rail, with the result that an equilibrium is established on a smaller area and the actual breaking down of the metal occurs under a higher pressure.

1 2

Contacts of 48-and-5-16-inch Steel Tired Trailer Truck Wheel, Atlantic Locomotive. Weight on Wheel 19,210 lbs.

In the case of the cast-iron wheel, it will be noted that the curve of average pressure shows a break and yield of the material at a load of 27,000 lbs. though it rises again and makes a second complete break at 37,500 lbs. from which there is no recovery. In the case of the steel wheel, the breakdown does not occur until a load of 50,000 lbs. is reached, and even then there is a gradual and practically uniform advance to 150,000 lbs.

In the tests of both the cast-iron wheel and the steel wheel, the permanent set was all in the rail. Both wheels were carefully examined with a microscope after the load of 150,000 lbs. had been imposed and the tests were completed and no appearance of yielding or cracking of either could be detected. The rail, on the other hand, showed signs of a permanent set under a load of 20,000 lbs., and this set increased with the increasing loads. The rail was

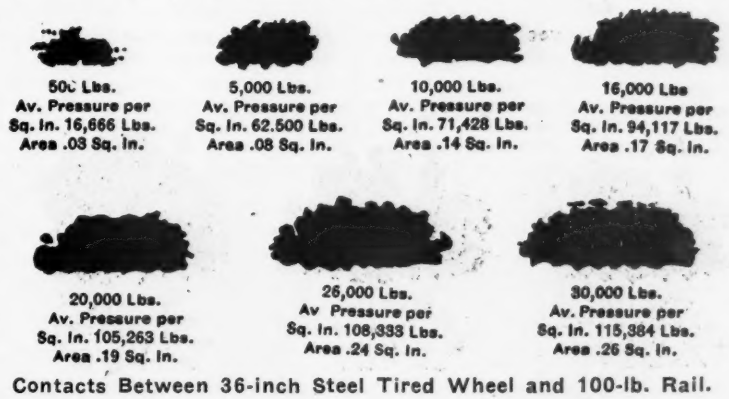


Contacts Between 36-inch Steel Tired Wheel and 80-lb. Rail.

examined immediately after applying loads of 12,000, 15,000, 25,000, 30,000, 35,000 and 40,000 lbs. The spot or depression left by the wheel could be seen after the 20,000 lbs. load had been imposed but not before.

The difference between the areas of contact of the wheels under cars and locomotives and the wheels tested in the laboratory, in which the area was larger, is probably due to the fact that the wheels under the cars and locomotives were worn somewhat hollow and so fitted the rail head to a greater extent. In service, however, the swinging of the wheels from one side of the track to the other brings the projections on the outer edge of the rim against the rail, undoubtedly causing a much higher load to be put on a smaller area of contact than was applied in the laboratory.

The permanent set taken by the rail at so low a load as 20,000 lbs. raised the question of the maximum pressure imposed at the center of the area of contact. It was assumed that, when the wheel first touched the rail, the area of contact would be a mathematical point if both surfaces were perfectly smooth and true. As the load is increased, the metal in both the wheel and rail yields and the area of contact increases. This increase is from the center out to the edge, and the pressure per unit of area is evidently at a maximum at the center and decreases to nothing at the edge. In order to estimate approximately the maximum pressure it was assumed that the metal in the area on which a load had once been



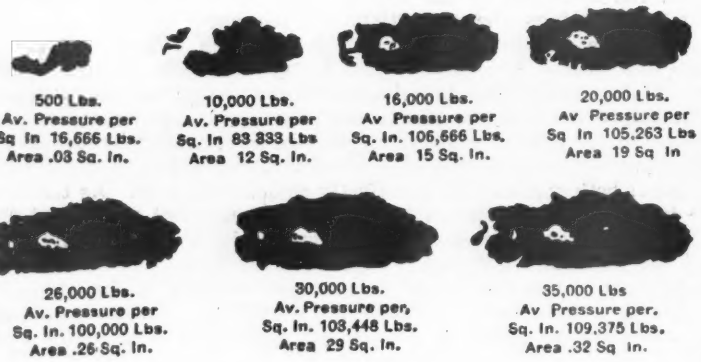
Contacts Between 36-inch Steel Tired Wheel and 100-lb. Rail.

imposed always sustained it, and by building up from the center by increments the final load was attained. Take the case of the 36-in. steel wheel on the 100-lb. rail. An area of .03 sq. in. sustained the initial load of 500 lbs., an average pressure of 16,666 lbs. per sq. in. By increasing this load to 5,000 lbs. the area is increased to .08 sq. in. If this extra 4,500 lbs. which was applied be considered as loaded uniformly over the whole area, there would be an average increase of pressure of 56,250 lbs. per sq. in., or 56,250 + 16,666 = 72,916 lbs. per sq. in. on the original .03 sq. in. which carried the initial load of 500 lbs. This assumption runs the load up to an exceedingly high limit, possibly too high, as it

Contacts Between 78-inch Steel Tired Wheel and 80-lb. Rail.

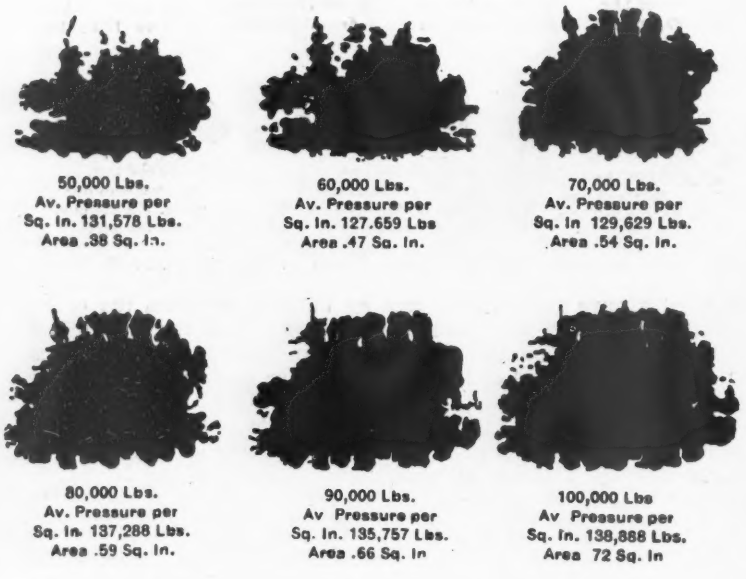
gives a pressure of more than 170,000 lbs. per sq. in. at the center of the area of contact, with a load of 20,000 lbs.

In considering the results obtained in this investigation, it must be borne in mind that the areas of contact were all obtained under static loads. Running conditions must necessarily be more severe and impose higher stresses. In an investigation conducted several years ago, it was found that the stresses in truck and body bolsters, while a car is in motion, are from 20 to 50 per cent. more than the stresses due to static loads alone. If this is true for parts located above the springs, there must certainly be an equal or greater increase at the point of contact between the wheel and the rail. Then, too, the blows received from passing over low joints or worn frogs, will raise the pressure between the wheel and the rail to a point which the tests under static loads have shown to be excessive. For example, the wheels, under a car of 100,000 lbs.



500 Lbs. Av. Pressure per Sq In 16,666 Lbs. Area .03 Sq. In.
10,000 Lbs. Av. Pressure per Sq. In 83 333 Lbs Area 12 Sq. In.
16,000 Lbs. Av Pressure per Sq. In. 106,666 Lbs. Area 15 Sq. In.
20,000 Lbs. Av Pressure per Sq In 105,263 Lbs Area 19 Sq In
26,000 Lbs. Av. Pressure per Sq. In. 100,000 Lbs. Area .26 Sq. In.
30,000 Lbs. Av. Pressure per, Sq. In. 103,448 Lbs. Area 29 Sq. In.
35,000 Lbs Av Pressure per. Sq. In. 109,375 Lbs. Area .32 Sq In.

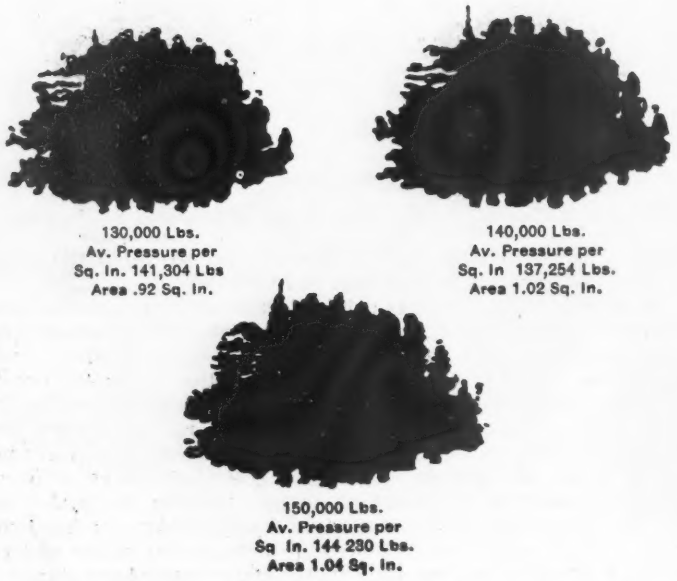
Contacts Between 78-inch Steel Tired Wheel and 100-lb. Rail.



50,000 Lbs. Av. Pressure per Sq. In. 131,578 Lbs. Area .38 Sq. In.
60,000 Lbs. Av. Pressure per Sq. In. 127.659 Lbs Area .47 Sq. In.
70,000 Lbs. Av. Pressure per Sq. In 129,629 Lbs. Area .54 Sq. In.
80,000 Lbs. Av. Pressure per Sq. In 137,288 Lbs. Area .59 Sq. In.
90,000 Lbs. Av Pressure per Sq. In. 135,757 Lbs. Area .66 Sq. In
100,000 Lbs Av Pressure per Sq. In. 138,888 Lbs. Area 72 Sq. In

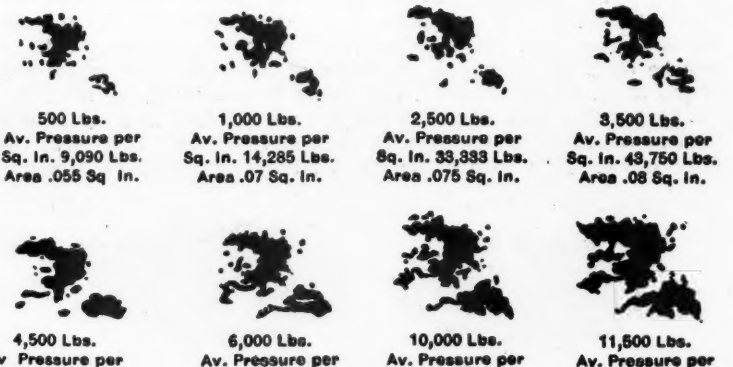
110,000 Lbs. Av. Pressure per Sq. In. 137,500 Lbs Area .80 Sq. In.
120,000 Lbs. Av Pressure per Sq In. 141,176 Lbs Area .85 Sq. In

Contacts Between 36-inch Steel Wheel and 100-lb. Rail.

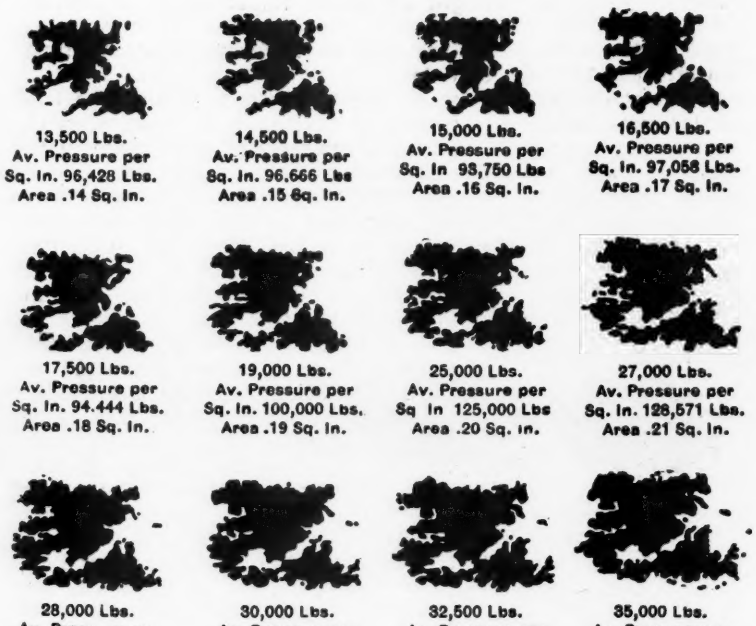


130,000 Lbs. Av. Pressure per Sq. In. 141,304 Lbs Area .92 Sq. In.
140,000 Lbs. Av. Pressure per Sq. In 137,254 Lbs. Area 1.02 Sq. In.
150,000 Lbs. Av. Pressure per Sq In. 144 230 Lbs. Area 1.04 Sq. In.

Contacts Between 36-inch Steel Wheel and 100-lb. Rail.

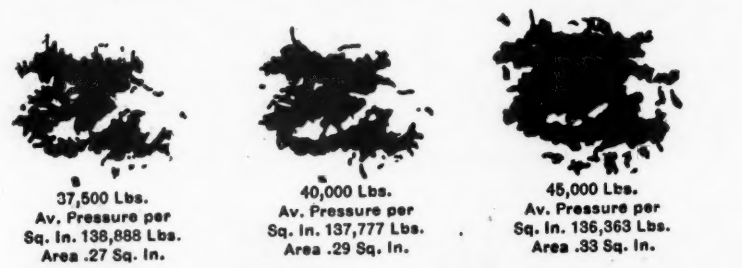


500 Lbs. Av. Pressure per Sq. In. 9,090 Lbs. Area .055 Sq In.
1,000 Lbs. Av. Pressure per Sq. In. 14,285 Lbs. Area .07 Sq. In.
2,500 Lbs. Av. Pressure per Sq. In. 33,333 Lbs. Area .075 Sq. In.
3,500 Lbs. Av. Pressure per Sq. In. 43,750 Lbs. Area .08 Sq. In.
4,500 Lbs. Av Pressure per Sq. In. 50,000 Lbs. Area .09 Sq. In.
6,000 Lbs. Av. Pressure per Sq. In. 54,545 Lbs. Area .11 Sq. In.
10,000 Lbs. Av. Pressure per Sq. In. 83,333 Lbs. Area .12 Sq. In.
11,500 Lbs. Av. Pressure per Sq. In. 88,461 Lbs. Area .13 Sq. In.



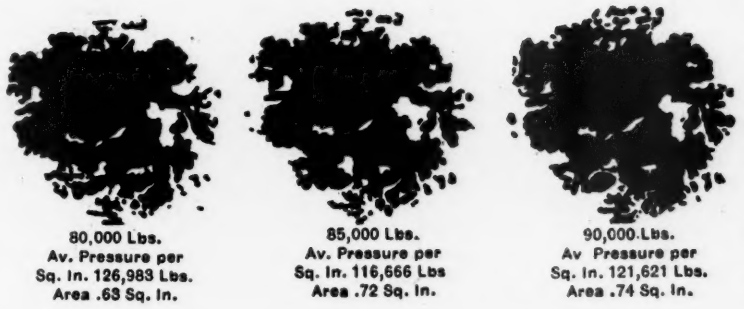
13,500 Lbs. Av. Pressure per Sq. In. 96,428 Lbs. Area .14 Sq. In.
14,500 Lbs. Av. Pressure per Sq. In. 96,666 Lbs Area .15 Sq. In.
15,000 Lbs. Av. Pressure per Sq. In 93,750 Lbs Area .16 Sq. In.
16,500 Lbs. Av. Pressure per Sq. In. 97,058 Lbs. Area .17 Sq. In.
17,500 Lbs. Av. Pressure per Sq. In. 94.444 Lbs. Area .18 Sq. In.
19,000 Lbs. Av. Pressure per Sq. In. 100,000 Lbs. Area .19 Sq. In.
25,000 Lbs. Av. Pressure per Sq In 125,000 Lbs Area .20 Sq. In.
27,000 Lbs. Av. Pressure per Sq. In. 128,571 Lbs. Area .21 Sq. In.
28,000 Lbs. Av. Pressure per Sq. In. 127,272 Lbs. Area .22 Sq. In.
30,000 Lbs. Av. Pressure per Sq. In. 130,434 Lbs. Area .23 Sq. In.
32,500 Lbs. Av. Pressure per Sq. In. 130,000 Lbs. Area .25 Sq. In.
35,000 Lbs. Av. Pressure per Sq. In. 134,615 Lbs. Area .26 Sq. In.

Contacts Between 33-inch Cast Iron Wheel and 100-lb. Rail.



37,500 Lbs. Av. Pressure per Sq. In. 138,888 Lbs. Area .27 Sq. In.
40,000 Lbs. Av. Pressure per Sq. In. 137,777 Lbs. Area .29 Sq. In.
45,000 Lbs. Av. Pressure per Sq. In. 136,363 Lbs. Area .33 Sq. In.
50,000 Lbs. Av. Pressure per Sq. In. 121,951 Lbs Area .41 Sq. In.
55,000 Lbs. Av. Pressure per Sq. In. 119,565 Lbs. Area .46 Sq. In.
59,000 Lbs. Av. Pressure per Sq. In. 118,000 Lbs. Area .50 Sq. In.
65,000 Lbs. Av. Pressure per Sq. In. 118 181 Lbs. Area .55 Sq. In.
70,000 Lbs. Av. Pressure per Sq. In. 118,644 Lbs. Area .59 Sq. In.
75,000 Lbs. Av. Pressure per Sq In. 122,950 Lbs. Area .61 Sq. In.

Contacts Between 33-inch Cast Iron Wheel and 100-lb. Rail.



Contacts Between 33-inch Cast Iron Wheel and 100-lb. Rail.

Contacts Between 33-inch Cast Iron Wheel and 100-lb. Rail.

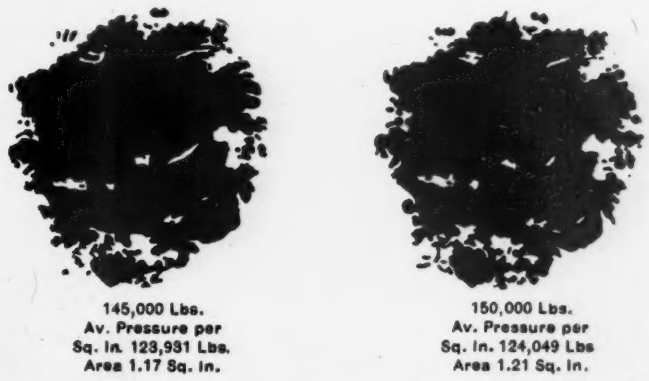
capacity with a 10 per cent. overload, carry an approximate static load of 18,750 lbs. each. A drop of $^1/_{16}$ in. is equivalent to a blow of about 97 foot lbs. If the drop is checked by a yield in the rail of three-eighths of the amount of the drop ($^3/_{128}$ in.) the pressure on the rail will amount to 50,000 lbs. This is certainly excessive.

Comparing the steel and cast-iron wheels, it appears that no damage was done to either wheel under a static load of 150,000 lbs. If the two wheels are subjected to the pounding action of service, however, the result cannot fail to be the earlier disintegration of the harder, more unyielding and more brittle material. Exact comparative data along this line are not yet available.

The conclusions to be drawn from this part of the work may be summed up as follows:

The average pressure imposed on the metal of the wheel and rail is within safe limits at low loads, but when a load of 20,000 lbs. is reached the elastic limit of the metal is passed and a permanent set appears in the rail.

The accumulated pressure at the center of the area of contact is excessive at comparatively small loads, and is only prevented from doing injury by the support of the surrounding metal. How far this compression extends into the body of the two pieces of metal in contact is not known but presumably it extends down to the base of the rail and into the hub of the wheel.



Contacts Between 33-inch Cast Iron Wheel and 100-lb. Rail.

Under a static load the rail yields first, owing, probably, to the fact that the metal of the surface of the head of the rail is not as well supported by the metal below as in the case of the wheel.

The effect of difference of diameter in wheels carrying the same load is insignificant and is only appreciable when the difference is great. Hence, it is immaterial, so far as stresses on the wheel or rail are concerned, whether small or large wheels, within the limit of practice, are used.

A hard, unyielding cast-iron wheel inflicts more damage on the rail than a steel wheel and the wear of the rail will be greater with the cast-iron wheels than with the steel wheels.

It is probable that the reason why the damage that would be expected from heavy wheel loads in service does not immediately appear, is that the rail, by bending under the passing wheel, increases the area of contact and thus relieves the surface stresses.

Massachusetts Street Railways.

From the annual returns of the street railway companies of Massachusetts to the railroad commissioners for the year which ended September 30, 1907, it appears that the street and interurban railway development of that state is still in advance of the requirements of the population. There are 80 companies whose returns may be considered in a summary of the situation as a whole, omitting most of those which are leased and the few which make returns but have not begun to do business. Out of these 80 there are 47 which declared no dividend at all during the year, and the official year ended before the financial depression had begun.

The highest dividend paid was 10 per cent., which was declared by the Middlesex & Boston and by the East Middlesex. The following roads come next with 8 per cent.: Holyoke; Athol and Orange; Springfield; West End (in Boston) preferred, (West End common pays 3½); Union (in Fall River), and the Dartmouth & Westport. Some of these are strong companies. The Holyoke had a year's surplus, after the dividend, of $8,479, making its total surplus $69,816. The Athol & Orange has a total surplus of $29,450, which is strong for a rural district. The Springfield rises to the large figure of $367,530 in all, its surplus for the year having been $4,698. Largest of all is the West End which, though it made only $285 surplus this year, has a total surplus of $1,150,093. The Union, with $29,851 for this year, reaches a total surplus of $208,605, which is large for Fall River. The Dartmouth & Westport, with a surplus this year of $21,823, reaches $78,731 in all. This company gets the benefit of nearness to New Bedford and Fall River.

The Worcester & Shrewsbury declared a 7.22 per cent. dividend;

the Newton & Watertown 7.2 per cent., and the Northampton 7 per cent.

Six per cent. was paid by the Fitchburg & Leominster; Linwood; Mount Tom; Pittsfield; Somerville, Winnisimmet (in Chelsea); Boston elevated, and the Boston & Worcester. The B. & W. is the principal interurban line in the state, competing with the Boston & Albany. It carries express matter, baggage and freight. The Boston elevated had a year's surplus of $33,278, and a total surplus of $668,603. The Boston & Worcester had a year's surplus of $3,034 and a total surplus of $14,951.

The Worcester Consolidated paid 5½ per cent. Five per cent. was paid by the Hampshire; the Webster & Dudley; the Worcester & Shrewsbury; the Boston & Northern; the Boston & Revere, and the Citizens' electric (in Fall River). The Old Colony (which, by consolidation, covers a large territory south of Boston) paid 4 per cent.; the Springfield & Eastern, 4; the North End (in Worcester), 3¾; the Milford & Uxbridge, 3; Newton, 2½; Uxbridge & Blackstone, 2; Natick & Cochituate, 2.

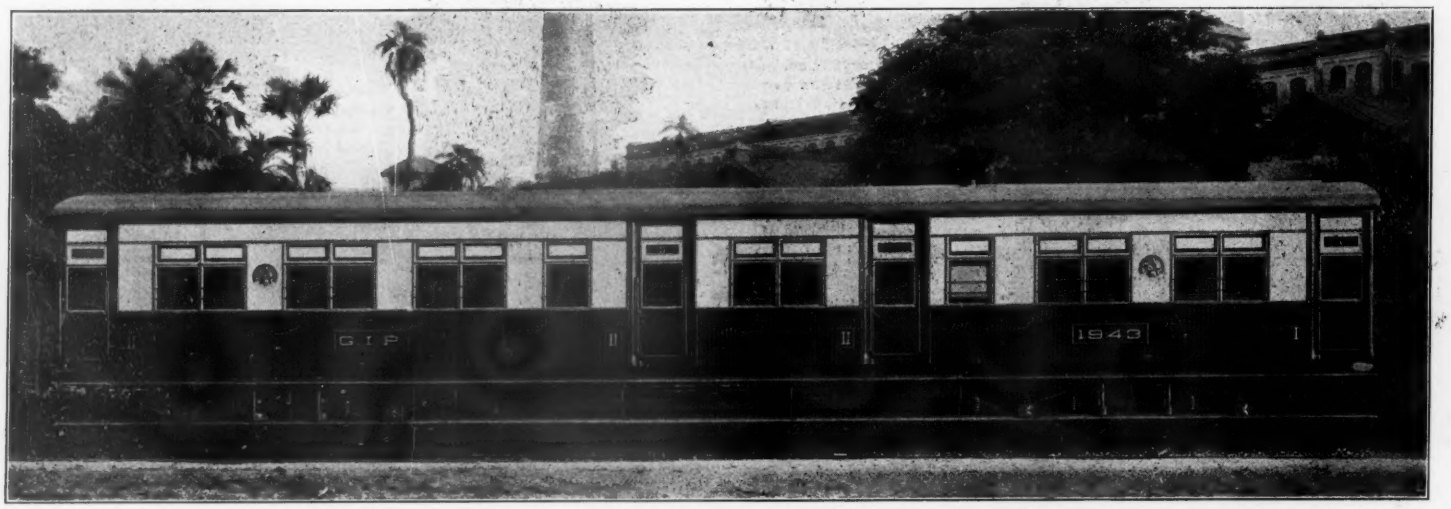
The 20 which were so unprofitable as to pay no dividends at all and besides had to show a deficit from the operations of the year, were the Haverhill & Amesbury; the Haverhill & Plaistow (N. H.); the Haverhill & Southern New Hampshire; the Marlboro & Westboro; the Worcester & Holden; the Ware and Brookfield; the Templeton; the Medfield & Medway; the Lowell, Acton & Maynard; the Lowell & Fitchburg; the Lowell & Pelham (N. H.); the Norton & Taunton; the Norwood, Canton & Sharon; the Conway; the Cottage City & Edgartown Traction; the Springfield & Eastern; the Berkshire; the Dedham & Franklin. Some of these have surpluses from former years: the Haverhill & Plaistow, $15,095; the Haverhill & Southern New Hampshire, $1,483; the Worcester & Holden, $7,065; the Lowell, Acton & Maynard, $857; the Springfield & Eastern, $14,576, and the Berkshire, $78,997.

The largest total deficits in the list are the Worcester & Southbridge, $77,395 (in spite of a surplus for the year of $43,949); the Templeton, $69,670; the Norton & Taunton, $39,870; the Norwood, Canton & Sharon, $61,407; the Blue Hill, $55,623; the Norfolk & Bristol, $61,274; the North End, $18,742; the Providence & Fall River, $20,939; the Amesbury, $19,247; the Amherst & Sunderland, $26,176.

There is constant pressure on the part of the people for better accommodations, for larger privileges of transfers, for reduced fares, especially to 5 cents within the limits of any municipality, no matter how long the distance traveled, and for more cars for working people during the hours when they are going to and from work. The railroad commissioners have tried to grant the requests of the public whenever the companies were financially able; but there have been several recent cases in which the companies were held not justified by their financial condition in doing what the public wanted. The Commission adheres closely to the principle that private persons cannot be expected to invest their money in public service at a loss, though in a few cases it has required companies to run particular cars which are unprofitable, holding that the general business of the company could bear the loss.

Passenger Cars for Tropical Climates.

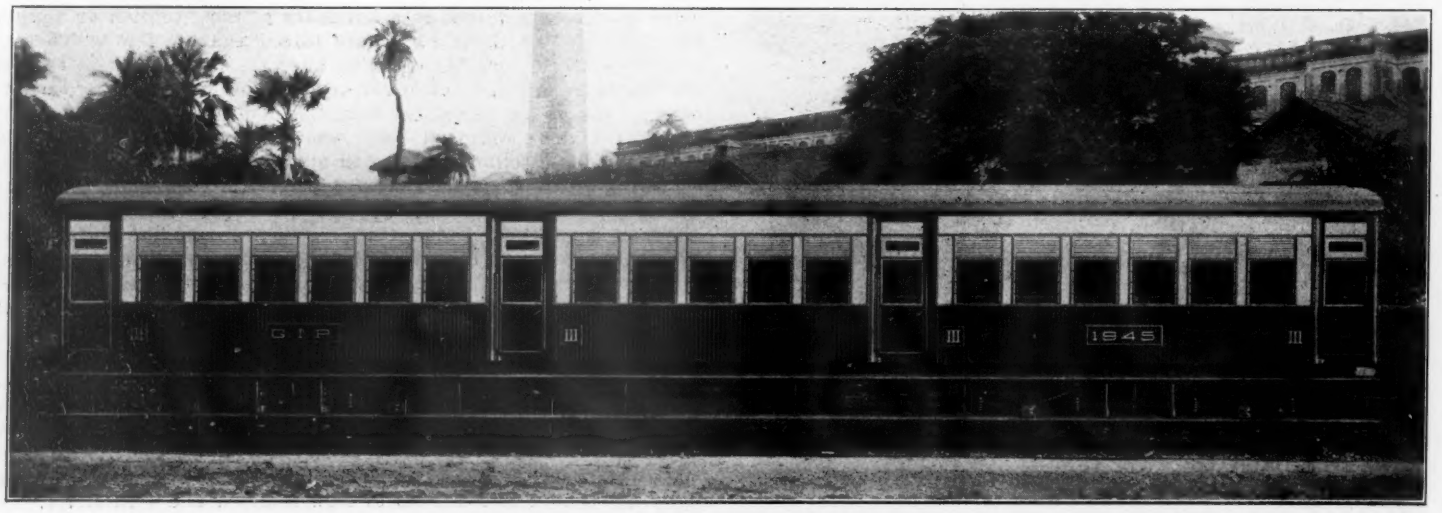
A train known as No. 7 of the local series has just been built at Parel Shops of the Great Indian Peninsula Railway, Bombay, from the designs of A. M. Bell, Carriage Superintendent, which possesses some novel features in construction. The train consists of seven open cars coupled together with open gangways for the free passage of the train staff, ticket collectors, etc. The front vehicle is a third-class brake, with a compartment for women, the next a



Combination First and Second Class Car; Great Indian Peninsula Railway.

first and second class composite, with a private compartment for women, the third a second and third class composite; the fourth, fifth and sixth vehicles are third class only, and the last a third-class brake like the front one. The cars are each 62 ft. long and 10 ft. wide with the doors, which open inward, set back to 9 ft, 6 in. over. There are lavatories for each class of passengers, and the total seating capacity is for 20 first class, 90 second class and 550 third class. There is a luggage compartment at each end of the train, provided with seats, as on each journey a certain number of fishwomen invariably take possession of the front compartment and persist in remaining there with their wares.

The carriages are built on steel underframes, each running on two four-wheel trucks, with 10-ft. wheel centers. The framing of the bodies is of teak braced with diagonals from end to end, and the lower portion is matchboarded with very narrow strips of teak taken from the waste of the sawmill. The employment of these very narrow strips overcomes the difficulty of splitting—an almost certain



Third Class Car; Great Indian Peninsula Railway.

failing of any wide wood panels in India. In this difficulty is to be found the explanation for the use of so much steel paneling on carriages built for tropical climates. Steel, however, has disadvantages; it readily takes up heat from the sun's rays and thus tends to warm up the interiors of the carriages rather than cool them. To counteract this and protect the interior, it has been the practice in all the newer cars built for the G. I. P. Railway without sun-shades to provide a layer of non-conducting material behind the steel sheeting. A carriage body thus consisted of three shells—viz., the outer paneling of steel, the intermediate lining of non-conductor and the internal lining of wood. Obviously, if a suitable heat resisting material could be found for the outer panels impervious to moisture and sufficiently strong to resist the bad treatment the body of a railroad carriage is subject to in service, the intermediate lining could be neglected. In the train described this has been done, the outer panels above the waist are of hard "Uacolite" sheet—a material largely composed of asbestos and possessing very satisfactory heat-resisting properties. This is screwed to the pillars and framing in such a manner that air-tight cells are secured between the inner and outer skins of the car body in which the stagnant air further ensures the non-conductivity of the sides. The roof is similarly treated, but covered with a thin teak wood casing to offer a continuous surface for the roof canvas. About 1,000 sq. ft. of "Uacolite" is incorporated in the construction of each car. To save time in the finish the lower sheeting is varnished, while the upper is painted with a quick-drying paint enamel. There is no lining except along the upper mouldings, and the letters, etc., are on embossed plates attached by screws. This procedure makes it unnecessary for the cars to wait for days in the paint shops for sizing, gilding and varnishing of letters and stripes.

The cars have a center aisle between "turn-over" seats, plain slatted wooden ones in the third class, spring seats upholstered in leather cloth in the second class and smooth-cushioned buffalo hide in the first. This style of seat enables the passengers always to face the engine and the breeze. All doors open inwardly and a simple gravity "slam" lock is provided.

The train is lighted throughout by electric light, a large dynamo of 1,000 watts being mounted under each brake and a small 250 machine under the center coach, this being the spare vehicle in case of reduction or increase of the size of the train. Punkah fans are provided in the first and second class (ladies') compartments. Alarm signal apparatus is installed in each car with handles in convenient places.

To indicate the destination of the train, prominent scarlet boards lettered in gold are used. They are illuminated at night by the front light of the electric tail side lamps.

Interior of Third Class Car.

Consumption of Ties in 1906.*

The statements in this report are based on the number of ties bought rather than on the number actually used. For all practical purposes, however, the two are identical; because the purchases in 12 months are an accurate index of consumption for a corresponding period.

The purchases of ties by steam and street railroads of the United States during the year 1906 amounted to 102,834,042, valued at $48,819,124, an average of 47 cents per tie. This value represents the cost to the purchaser at the point of purchase. In many, perhaps most, cases this point of purchase is the point of production, near the road's right of way; but in others, and this is particularly true of sawed pine ties, long shipments are involved and the point of purchase is a local distributing market, distant from the source of supply. The average value of 47 cents, therefore, probably represents a higher rate than that received by the producer. The steam railroads purchased 93,477,625 ties, or about nine-tenths of the whole number.

Street railways as a rule use a smaller, lighter tie than that required by the steam roads, so their material is less difficult to obtain.

*Circular 124, Forest Service, Department of Agriculture.

KINDS OF WOODS USED.

Table 1 summarizes, by kinds of wood, the quantities of hewed and sawed ties purchased in 1906. Approximately one-fourth were sawed and three-fourths hewed.

TABLE 1.—*Ties Purchased by Steam and Street Railroads in* 1906.

Kind of wood.	Total.	Hewed.	Sawed.
Oaks	45,357,874	38,269,030	7,088,844
Southern pines	18,841,210	13,745,716	5,095,494
Douglas fir	7,248,562	657,934	6,590,628
Cedar	7,083,442	5,429,305	1,654,137
Chestnut	6,588,975	5,450,920	1,138,055
Cypress	5,104,496	4,448,052	656,444
Western pine	3,969,605	1,884,096	2,085,509
Tamarack	2,576,859	2,360,873	215,986
Hemlock	2,058,198	1,928,726	129,472
Redwood	1,248,629	892,687	355,942
Lodgepole pine	554,738	554,738	.....
White pine	373,387	278,270	95,117
All others	1,828,067	1,593,647	234,420
Total	102,834,042	77,493,994	25,340,048

Table 2 shows the quantity and value of hewed and sawed ties of various woods purchased by steam and street railroad companies in 1906. The average value of the sawed tie is higher than that of the hewed tie.

Oak, the chief wood used for ties, furnishes more than 44 per cent., nearly one-half of the whole number, while the southern pines, which rank second, contribute about one-sixth. Douglas fir and cedar, the next two, with approximately equal quantities, supply less than one-fifteenth apiece. Chestnut, cypress, western pine, tamarack, hemlock and redwood are all of importance, but no one of them furnishes more than a small proportion.

Oak and southern pine stand highest in both total and average value; the average value of each is 51 cents. Chestnut ranks next, followed by cedar. Hemlock, at 28 cents, is the cheapest tie reported.

More than three-fourths of all ties are hewed; and with every

TABLE 2.—*Number and Value of Ties Purchased by Steam and Street Railroads of the United States in* 1906.

	Total			Steam railroads.						Street railways.					
				Hewed.			Sawed.			Hewed.			Sawed.		
	No.	Value.	Ave. value, pr tie.	No.	Value.	Ave. value, pr tie.	No.	Value.	Ave. value, pr tie.	No.	Value.	Ave. value, pr tie.	No.	Value.	Ave. value, pr tie.
Oaks	45,357,874	$23,278,052	$0.51	35,507,777	$17,583,827	$0.50	6,024,852	$3,672,691	$0.61	2,761,253	$1,428,714	$0.52	1,063,992	$592,820	$0.56
Southern pines	18,841,210	9,567,745	.51	12,851,239	6,311,585	.49	4,686,851	2,593,424	.55	894,477	438,180	.49	408,643	224,556	.55
Douglas fir	7,248,562	3,010,392	.42	631,939	220,331	.35	6,074,283	2,562,636	.42	25,995	8,747	.34	516,345	218,678	.42
Cedar	7,083,442	3,310,116	.47	4,940,337	2,334,675	.47	1,476,530	709,771	.48	488,968	194,238	.40	177,607	71,432	.40
Chestnut	6,588,975	2,995,942	.49	3,878,970	1,787,167	.46	767,793	345,817	.45	1,571,950	701,301	.45	370,262	161,657	.44
Cypress	5,104,496	1,862,135	.36	4,354,720	1,512,033	.35	633,865	301,467	.48	93,332	36,920	.40	22,579	11,715	.52
Western pine	3,969,605	1,698,027	.43	1,869,731	840,555	.45	2,039,769	832,804	.41	14,365	4,641	.32	45,740	20,027	.44
Tamarack	2,576,859	889,561	.35	2,340,050	795,803	.34	90,186	41,414	.46	20,823	7,394	.35	125,800	44,950	.36
Hemlock	2,058,198	582,968	.28	1,912,540	523,741	.27	124,462	53,155	.43	16,186	4,532	.28	5,010	1,540	.31
Redwood	1,248,629	536,172	.43	539,060	182,343	.34	186,286	66,501	.36	353,627	171,939	.49	169,656	115,389	.68
Lodgepole pine	554,738	210,818	.38	553,838	210,458	.38	.....	.....	...	900	360	.40	.....	.....	...
White pine	373,387	151,052	.40	243,515	70,397	.29	14,515	6,436	.44	34,755	17,108	.49	80,602	57,111	.71
All others	1,828,067	726,144	.40	1,575,699	587,162	.37	158,818	74,339	.47	17,948	8,437	.47	75,602	56,206	.74
Total	102,834,042	$48,819,124	$0.47	71,199,415	$32,960,077	$0.46	22,278,210	$11,260,455	$0.51	6,294,579	$3,022,511	$0.48	3,061,838	$1,576,081	$0.52

wood from which ties are made, except Douglas fir and western pine, the number of hewed ties is greater than the number sawed. About ten times as many Douglas fir ties are sawed as are hewed. Of the oak ties a little over one-sixth and of the southern pine ties less than one-third are sawed. In general, when lumber has a relatively low value the proportion of sawed ties increases, because the market for ties is always active, while that for lumber is frequently sluggish. All western species are affected by this condition, for stumpage is abundant and its value relatively low.

About one-third of the ties used by street railways are sawed, but not quite one-fourth of those used by steam roads. The greater proportion of sawed ties used by street lines is probably due to the fact that much of the trackage within city limits is on paved streets, where sawed ties are more satisfactory on account of their regular shape.

The average price of the sawed tie is, as a rule, higher than that of the hewed one, despite the fact that the hewed tie is more durable. This peculiar condition of an inferior commodity bringing a higher price is brought about by the difference in market conditions. Sawed ties, though admittedly less durable, represent a potential value equivalent to the amount of lumber into which they could be cut. Hewed ties, on the other hand, compete only with posts or fuel wood, both of which are of lower value.

CONSUMPTION IN 1905 AND IN 1906.

Table 3 shows the number and value of the different kinds of ties purchased by the steam and street railroad lines in the United States in 1906, and contrasts the purchases of steam railroad companies in 1905 and 1906. No statistics are available upon the purchases by street lines in 1905.

TABLE 3.—*Number and Value of Ties Purchased by Steam and Street Railroads in the United States in* 1905 *and* 1906.

	Steam railroads, 1905.			Steam railroads, 1906.			Street railways, 1906.*		
	No.	Value.	Av. value, per tie.	No.	Value.	Av. value, per tie.	No.	Value.	Av. value, per tie.
Oaks	34,677,304	$19,072,517	$0.55	41,532,629	$21,256,518	$0.51	3,825,245	$2,021,534	$0.53
Southern pines.†	18,351,037	7,707,436	.42	17,538,090	8,905,009	.51	1,303,120	662,736	.51
Cedar	6,962,827	3,063,644	.44	6,416,867	3,044,446	.47	666,575	265,670	.40
Douglas fir	3,633,276	1,198,981	.33	6,706,222	2,782,967	.41	542,340	227,425	.42
Chestnut	4,717,604	2,264,450	.48	4,646,763	2,132,984	.46	1,942,212	862,958	.44
Cypress	3,483,746	1,149,636	.33	4,988,585	1,813,500	.36	115,911	48,635	.42
Western pine	.....‡	.....	...	3,909,500	1,673,359	.43	60,105	24,668	.41
Tamarack	3,060,082	1,101,630	.36	2,430,236	837,217	.34	146,623	52,344	.36
Hemlock	1,713,090	565,320	.33	2,037,002	576,896	.28	21,196	6,072	.29
Redwood	590,852	118,170	.20	725,346	248,844	.34	523,283	287,328	.55
Lodgepole pine	.....‡	.....	...	553,838	210,458	.38	900	360	.40
White pine	.....‡	.....	...	258,030	76,833	.30	115,357	74,219	.64
All others	791,409	343,662	.43	1,734,517	661,501	.38	93,550	64,643	.69
Total	77,981,227	$36,585,446	$0.47	93,477,625	$44,220,532	$0.47	9,356,417	$4,598,592	$0.49

*No figures for street railways in 1905.
†For 1905 includes white pine, lodgepole pine, and western pine.
‡Included in southern pines.

The purchases of ties reported by the steam railroad companies in 1906 exceeded those of 1905 by more than 15,000,000. Nearly one-half of this excess was oak. The purchases of cedar ties showed a decrease of about one-half million, due possibly to the sharp demand for cedar poles, which operated against the production of ties. Douglas fir ties nearly doubled in quantity, and both cypress and hemlock increased by a large percentage, but tamarack purchases fell off more than one-fifth and chestnut about 1.5 per cent.

The street railways use about the same proportion of oak ties as the steam roads, a larger proportion of southern pine, cedar, chestnut, cypress and hemlock, but a smaller proportion of Douglas fir, western pine and tamarack. Comparing the consumption of ties by steam railroads and street railways, there is practically no difference between the average values per tie for all kinds of timber combined, but the average costs per tie for the individual kinds of wood show some wide variations. These cannot be attributed to any general condition, but are probably due to local influences which operate to increase or decrease the cost to users of certain kinds of ties in particular regions. Such local conditions in turn affect the general average for the kind of timber for the whole United States.

PRESERVATION.

The question of tie preservation is becoming more and more important as the demand for tie material increases and the traffic requirements become more exacting. So long as plenty of white oak ties could be secured the necessity for tie preservation was not felt; but with the constantly increasing use of pine and other less decay-resistant woods, it has become a vital economic question. The railroad companies have met the problem by establishing treating plants in various parts of the United States and by laying experimental tracks with treated ties to determine the efficiency of the several preservatives under varying conditions.

In 1906 the purchases of treated ties by steam and street railroad companies combined amounted to 5,289,435; in addition to this quantity, the companies treated 6,490,203 at their own plants, a total of 11,779,630 treated ties during the year, or 11.5 per cent. of the whole number. Of this total the steam railroad companies purchased, during the year, 4,773,116 treated ties, and applied preservatives to 6,365,523 at their own plants. The street lines used 640,999 treated ties, 516,319 of them already prepared when they were bought, and 124,680 treated at their own plants.

State Control of Fast Interstate Trains.

The decision of the Supreme Court of the United States nullifying an order of the Railroad Commission of South Carolina directing the Atlantic Coast Line to stop a through fast train at Latta, a town of 453 inhabitants, was reported in the *Railroad Gazette* last week, page 727. Justice Peckham, in delivering the opinion, reviewed the defense of the road, in which it was shown that in addition to a number of daily local passenger trains there was also furnished the citizens of Latta the convenience of a daily passenger train each way for through travel north and south, and sustained the claim that the order of the commission was unreasonable and unnecessary; a direct burden upon interstate commerce, and therefore a violation of and in conflict with the authority given exclusively to Congress by the Constitution to regulate interstate commerce. Continuing Justice Peckham said:

"That any exercise of state authority, in whatever form manifested, which directly regulates interstate commerce, is repugnant to the commerce clause of the Constitution, is obvious. Any command of a state the necessary effect of which is to order the stopping of an interstate train at a named station or stations, if it directly regulates interstate commerce, is void. * * * But some orders which may cause the stoppage of interstate trains may be valid, if they do not directly regulate such commerce. The question of whether such order is void as a direct regulation of such commerce may be tested by considering the nature of the order and the character of the interstate commerce train to which it applies. It also may be tested by considering the adequacy of the local facilities. * * * "True, inherently considered, whether there be local facilities is not a Federal question, but in so far as the existence of such adequate local facilities is involved in the determination of the Federal question of whether the order concerning an interstate train does or does not directly regulate interstate commerce, that question for such purpose is open and may be considered by us."

Justice Peckham then proceeds to declare that local conditions do not necessitate the stopping of the trains in question at Latta. The railroad company has furnished such reasonable accommodations to the people of the place as it can be fairly and properly called upon to give. To stop these trains at Latta and other stations which could bring equally strong reasons for the stoppage of the trains at their stations, would wholly change the character of the trains, rendering them no better in regard to speed than the other trains and would result in the inability of what had been fast trains to make their schedule time, and a consequent loss of patronage, also the loss of compensation for carrying the mails, which would be withdrawn from them, and the end would be the withdrawal of the trains, because of their inability to pay expenses.

Foreign Railroad Notes.

The railroads of Siam were not increased in length during the last fiscal year, but their gross earnings increased 26 per cent. and their net earnings 21¾ per cent., the latter being 5.13 per cent. on the cost of the roads, which, however, has been only $27,240 per mile. The working expenses were only 36⅜ per cent. of the gross earnings.

The Italian State Railroads have a new head, the late Minister of Public Works, Giantuico, having retired on account of serious illness. The new minister is Pietro Bertolini, who has been an under secretary in previous cabinets, and is regarded as a capable administrator, and a firm character, not likely to be bulldozed by the organized employees.

GENERAL NEWS SECTION

NOTES.

The New York, New Haven & Hartford has modified its notice canceling through freight rates over the Central of New Jersey, making the date on which the notice will take effect March 31.

The United States District Court at Kansas City has issued a temporary injunction against the enforcement of the reduced express rates ordered by the Missouri State Railroad Commission.

The New York, New Haven & Hartford has announced at Boston that beginning December 28 a charge of 10 cents a ton will be made in all cases where carload freight is unloaded by the company into freight houses.

In the United States Circuit Court at Chicago December 14, a final decree was entered in the suits of 16 railroads against 52 ticket brokers, which, it is said, strikes a death blow at the business of ticket scalping in Chicago.

The pension plan for the employees of the Erie Railroad, which for some time has been under consideration by a committee representing the company and the employees, is based on rules under which the company will provide about one-half the funds necessary to pay the pensions, the other half to be contributed by the employees themselves.

The Supreme Court of Wisconsin has declared unconstitutional the law passed in that state this year permitting passengers in the lower berth of a sleeping car to require the upper berth, when unoccupied, to be pushed up, so as to give more room in the lower berth. The court decides that a law of this kind is not a reasonable exercise of the police power.

Mr. Walter P. Hall, the new Chairman of the Massachusetts State Railroad Commission, was promoted to that place from the office of Assistant Attorney General. He has had much experience in managing the interests of the state in connection with grade crossings and other railroad matters. He has practiced law in Fitchburg since 1892, and has been City Solicitor and Assistant District Attorney.

Reports from Ohio say that since the reduction of ticket fares to 2 cents a mile and the abolition of an extra charge in case of payment of fare in cash on trains, the number of cash fares collected has increased so largely that the work of the conductors has been made burdensome; and it is said that the railroads are going to try to secure legislation to suitably penalize passengers who do not buy tickets before boarding trains.

The Missouri Pacific has taken off a number of passenger trains from its secondary lines in Kansas. On one line of 85 miles and another of 42 miles the passenger service is discontinued and passengers will have to ride on mixed trains. A press despatch from Topeka states that, because of this action, the Kansas Railroad Commission has ordered the Attorney-General to sue for the revocation of the charter of the Missouri Pacific.

At a hearing before the Interstate Commerce Commission at Washington last Monday on the complaint of the Oregon and Washington lumber shippers, President James J. Hill, of the Great Northern, said that the increase in freight rates had been determined on simply because lumber was being carried at less than cost; there was an average loss of $80 a car. The revenue per car averaged $200, while the cost was $280. This estimate of cost apparently includes something for hauling the lumber cars westward empty.

The Montreal ice carnival is to be frozen out, so to speak. According to a press despatch from St. John, N. B., the holding of ice and snow sports and all kinds of winter carnival attractions in Canada is to be frowned upon systematically by the railroads, their reason being that the advertising of these things gives the idea that Canada is "a mere frozen fringe north of the states." The idea may have a bad effect upon immigration. The passenger traffic managers of the Canadian Pacific and Grand Trunk are reported as declaring that they will refuse to advertise the events and will grant no special rates.

From reports printed in New York City it would seem that claims received by railroads for damage to butter and eggs have recently become so numerous as to be a serious burden both to the railroads and to the tradesmen; and a committee, representing merchants, in a communication to the Pennsylvania Railroad, declares that the trouble is due to the general use of air-brakes and automatic couplers. This statement, interpreted, means, no doubt, that the trouble is due mostly to the rough handling of cars in switching, which has been made possible by the introduction of the improvements named.

An officer of the Pennsylvania is authority for the statement that in the month of October the passenger receipts of that road in the state of Pennsylvania were $64,000 less than in the same month a year ago, while outside the state of Pennsylvania they increased 8 per cent.; and that but for the reduction to 2 cents a mile, ordered by the legislature, the receipts within the state apparently would have increased $140,000. The loss entailed by the law appears therefore to have been $204,000. The decrease is absolute and has not been offset by any increased business; the reduction has not stimulated travel.

It was announced at Raleigh, N. C., last week that Governor Glenn had come to an agreement with the Southern Railway under which the road would make all single ticket rates in the state 2½ cents a mile, both for intrastate and interstate trips, and sell mileage books of different classes at 2 cents. The Seaboard Air Line agreed to take the same action as that agreed to by the Southern. The next day, however, it was announced that the Atlantic Coast Line and others had rejected the proposition and, therefore, that the proposed agreement would fall through. To carry it out would have necessitated the calling of the legislature to rescind the rate laws now on the statute books, and the Governor declared that this would be useless unless all the roads would come in.

Between 6 a.m. and 12.10 night of every week-day there are 41 trains from New York to Philadelphia on the four-track line of the Pennsylvania Railroad, or an average of a train every 26 minutes. From 7 a.m. until 7 p.m. there are 33 trains, or an average of one in every 22 minutes. Seven of these trains make the run in two hours or less. Every one of these 41 trains, except four, has Pullman parlor or sleeping cars, and dining cars are attached to 17 of them. With one exception, all parlor cars have buffets except those on trains carrying dining cars. An equally complete service is maintained from Philadelphia to New York. The foregoing is from an advertisement of the Pennsylvania Railroad. The advertising agent believes that this is the most comprehensive and complete train service between any two cities in the world.

The New York State Public Service Commission for the First district (New York City) estimates that its expenses for the 1908 year will be $1,095,000, a figure which it is said was surprising to the Board of Estimate. The expenses of the Railroad Commission of Ohio for the last year were $37,305. The estimate of the New York commission contains the following: Office, telephone and rentals, $50,000; salaries, $850,000; furniture, $2,500; printing, stationery and supplies, $25,000; disbursements of employees and counsel, $15,000; maps, plans, prints and photographic apparatus, $5,000; engineering instruments and supplies, $10,000; compensation and expenses of special commissions, $10,000; advertising, $25,000; real estate searches and appraisals, $2,500; contingencies and rapid transit studies, $50,000, and special service and investigations, $50,000. The Board voted $71,000 to the Commission to pay the expenses until January 1, 1908.

At a hearing before the New York State Public Service Commission at Albany this week, on the question of making the fares on the New York Central more uniform, officers of that road announced their intention to make the rates on the Hudson division (New York to Albany) uniformly 2½ cents a mile. The short-distance rates on this division are now somewhat variable, though mostly not much above 2 cents a mile; but from New York to Albany, 142 miles, the fare through is $3.10, or nearly 2.2 cents a mile. Between Albany and Buffalo local fares are limited to 2 cents a mile by law, but the fare through to Buffalo is at a higher rate. It was stated that the tariff for the new increased rates on the Hudson division had already been printed, but it appears that no order has been issued fixing the day for putting it into effect. Under its charter the road may charge as high as 3 cents a mile on the Hudson division. Vice-President C. F. Daly said that the Central would abolish mileage tickets were it not for the competition of other roads.

The New York State Public Service Commission, Second district, has dismissed the complaint, made by a representative of a brotherhood against the Erie Railroad, alleging that not enough men were employed on certain passenger trains. On the trains in question there is in each case one brakeman, acting as rear flagman, and one porter. It appears that the porters are negroes. The railroad claimed that the porters were competent to act as rear flagmen in case of need, and the Commission sustains this position. The decision, by Chairman Stevens, declares that the complaint does not aver an insufficient number of trainmen and, therefore, that it can be entertained only as a complaint against the competency of the men. The only evidence supporting this charge is that one porter, last February, said that he had not passed an examination in flagging. But the General Manager of the road declares that now the colored trainmen-porters are competent to

discharge all of the duties of brakemen, and as this testimony is uncontradicted the Board dismisses the complaint.

Traffic Versus Main Line Mileage.

Chairman Knapp, of the Interstate Commerce Commission, had occasion to remark recently on the unequal increase this country is witnessing in the amount of traffic and the railroads' facilities for handling it. He estimated that whereas each of the past few years has seen an increase in the country's traffic of about 12 per cent., the railroads have grown in the same time at an average rate of only 2 per cent. It is freely predicted by authorities that the United States will find its industrial prosperity seriously retarded at no very distant date unless the transportation problem is given more liberal attention.

Below is a list of 14 important railroads whose tracks extend generally over all sections of the United States, with the amount of freight handled by each of them in the five years from 1902 to 1906 inclusive:

Number of tons, in thousands, of revenue freight carried:

	1906.	1905.	1904.	1903.	1902.
Southern Pacific	22,454	19,360	18,509	17,163	15,736
Union Pacific	13,048	11,204	10,264	9,657	8,590
Northern Pacific	15,356	13,036	13,283	12,791	11,080
Atchison	14,788	12,894	13,195	12,980	11,596
Rock Island	15,394	13,515	13,567	10,597	8,245
Erie	36,355	31,561	29,835	31,645	27,697
N. Y. Central	43,570	42,861	36,379	38,081	35,599
Pennsylvania	363,955	333,011	284,619	295,120	269,512
Baltimore & Ohio	65,216	56,322	50,964	52,249	49,476
Louisville & Nashville	24,553	21,041	21,429	20,677	18,320
Southern	23,518	20,973	20,733	19,197	16,811
Atlantic Coast Line	9,392	8,365	7,781	7,674	3,147
Illinois Central	25,641	23,148	22,420	21,881	19,096
New Haven	20,259	18,321	17,560	*17,350	17,145
Total	693,499	625,582	560,528	567,062	512,020

*Estimated.

The revenue freight hauled by these roads increased from 512,020,000 tons in 1902 to 693,499,000 tons in 1906, or about 181,479,000 tons. This is an increase of 35.4 per cent., or an average for each of the four years of nearly 9 per cent. A complete tabulation of every ton of freight carried by all roads, large and small, would probably show a larger percentage than this, owing to the new traffic originated by smaller systems in territory recently opened up.

How the railroads endeavored to keep pace with their growing business is shown by the two tables below. Operating a total mileage of 64,256 miles in 1902, they increased this in four years to 71,748, or 7,492 miles. This is an increase of 11.6 per cent., as compared with the growth of 35.4 per cent. in traffic.

Miles Operated.

	1906.	1905.	1904.	1903.	1902.
Southern Pacific	9,191	9,137	9,024	8,842	8,757
Union Pacific	5,403	5,357	5,352	5,762	5,710
Northern Pacific	5,401	5,314	5,262	5,111	5,019
Atchison	8,433	8,305	8,179	7,965	7,855
Rock Island	7,218	7,231	7,205	5,579	3,909
Erie	2,150	2,150	2,150	2,152	2,153
New York Central	3,783	3,774	3,490	3,422	3,319
Pennsylvania	3,756	3,695	3,670	3,663	3,663
Baltimore & Ohio	4,029	4,025	3,986	3,935	3,233
Louisville & Nashville	4,205	4,101	3,679	3,491	3,444
Southern	7,373	7,198	7,164	7,129	6,743
Atlantic Coast Line	4,327	4,306	4,192	4,138	4,138
Illinois Central	4,423	4,373	4,340	4,292	4,276
New Haven	2,056	2,087	2,057	*2,047	2,037
Total	71,748	71,053	69,759	67,528	64,256

*Estimated.

—*Wall Street Journal.*

Overhead Trolley on the Highland Division.

The line of the Highland division of the New York, New Haven & Hartford between East Hartford, Conn., and Vernon, 10 miles, is now traversed both by steam trains and by electric cars, the latter being those of the Connecticut Company. The principal termini of the electric company's line are Hartford and Rockville. The company will continue to operate the single-track electric line along the highway, parallel to the New Haven road, but the cars running over the New Haven tracks will furnish a faster service. Overhead trolley wires have been strung along the steam tracks, and this part of the road has been equipped with automatic block signals.

Old-Fashioned Interstate Commerce.

Charles W. Ellison, of Peekskill [N. Y.] sent his teams with five loads of furniture to Danbury, Conn., during the bad spell of weather a week or so ago. It was a tedious drive, as the roads were in bad condition. The furniture was taken in this way overland, because such freight is used so roughly on the cars that even at greater cost and the inconvenience of this mode of transportation, it was preferable to having it smashed to pieces on the cars. Nothing is handled with care any more on the New York Central. —*Highland Democrat.*

The distance between Peekskill and Danbury in an air line is 25 miles. The railroad route is rather roundabout, but even so, the engine ought to have a great advantage over the horses when it comes to a comparison of actual strain on the tender drawbar. From Peekskill north to Dutchess Junction by the New York Central the distance is 16 miles, and thence east by the New Haven to Danbury it is 46; total, 62 miles. The five teams were gone from home a week.

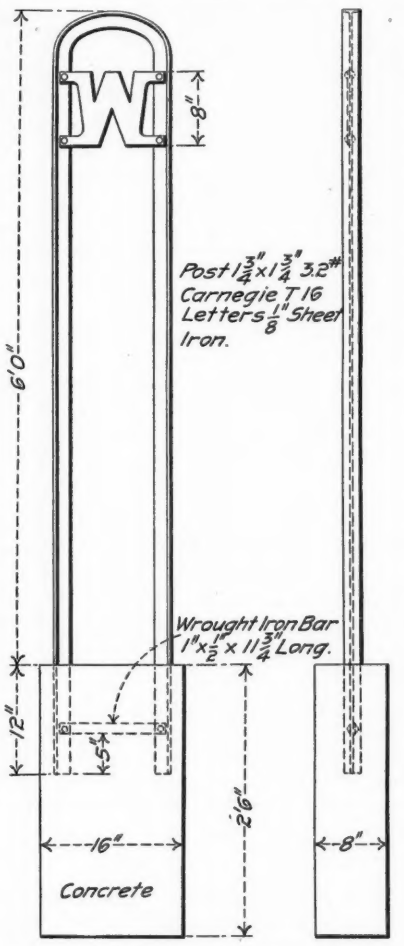
Reliable News.

We take no stock in the rumor that it is the South Manchester Railroad that is negotiating for the Boston & Maine.—*Hartford Courant.*

The "Continental" Whistling Post.

It is now possible to replace the familiar white tombstones with their black "W" and "R" that appear along our railroads at crossings and cuts by a durable, cheap and attractive steel whistling post.

The "Continental" whistling post has been designed to reduce the high cost of maintenance; to give longer life to the post and to keep the first cost as near that of the wooden post as possible. A light "T" iron is bent in an arch shape, the long ends of the "T" forming the legs of the post. The letters are stamped from sheet iron and riveted or bolted to the stems of the "T" near the top of the post. A bar riveted between the legs at the bottom of the post acts as an anchor when the post is set in concrete or in the ground.



The "Continental" Whistling Post.

The claims for this post are that being made of structural steel:

It will outlive the wooden post by many years.

It will reduce the amount of paint used to maintain the posts by at least 75 per cent.

It will reduce the amount of time necessary to properly maintain the posts by at least 75 per cent.

The letters will be silhouetted against any background in winter or summer.

Snow cannot drift against it.

Letters can be held in stock and new ones attached to a post at any time.

In all weather and under all conditions it will be efficient as a warning to the engineer.

This device is the invention of E. D. Hillman, Mechanical Engineer of the United States Metal & Manufacturing Company, New York, which is shortly to put the post on the market.

A Two-Cent Fare in Canada.

The Supreme Court of Canada has sustained the order of the Railway Commission made in July last directing the Grand Trunk Railway, as required by the terms of its charter, to run at least one train daily each way between Toronto and Montreal carrying passengers at a third class fare of 2 cents a mile.

Elaterite Car Roofing.

Elaterite car roofing consists of a solid body of elastic, non-drying "Elaterite" cement, reinforced in the middle with two layers of imported India burlap, and with an asphalt saturated wool-felt back. The top surface is finished with flake mica. It is put up in rolls of one square, 32 in. wide and 40 ft. long, or any length desired. No painting is required. The makers say that it is being used principally on western roads under severe conditions of torsion on curves and grades, where sudden, extreme changes in temperature occur and high winds and dry atmosphere prevail. An-

other advantage claimed is its resistance to fire. In lower altitudes and with greater humidity the results are correspondingly better. It is made by the Western Elaterite Roofing Co., Denver, Colo., whose product also includes high-grade roofings for roundhouses and for all other classes of railroad and general use; "Elaterite" paints for metal preservation and for heated surfaces; "Werco" cement for coating prepared roofing, and "Werco" waterproofing cement for masonry and concrete structures.

Driving It Home.

Bear in mind now that a stove factory in Atlanta made in 1906 over $47,000 of profits on an investment, as sworn to for taxation, of $46,475, and that Governor Smith tendered its president the position of railroad commissioner despite the fact that the legislature had disqualified him because he belonged to an association which raised the prices of stoves on the consumer. Bear in mind that a spring bed factory in Atlanta made in 1906 a profit of $41,000, on an investment, as sworn to for taxation, of $30,000, and that Governor Smith appointed its president a member of his staff. Bear in mind that he appointed to the position of railroad commissioner another gentleman who was the leading spirit in building and operating a cotton factory in La Grange which, in four years, on an investment of $251,000, made $370,000. Bear in mind that a great portion of the profits of the above three factories were secured by raising the prices of their products after the freight rates were reduced. And then read again Candidate Hoke Smith's declaration that "5 per cent. is a handsome return" for those who invest their money in railroad stocks and bonds, and that if he were elected Governor he would bring down the railroad rates sufficiently to place the income of railroad stockholders on the 5 per cent. basis.—*Ex-R. R. Comm. Joseph M. Brown, in Augusta Chronicle.*

INTERSTATE COMMERCE COMMISSION RULINGS.

Distribution of Cars to Shippers—No Fixed Rule.

The California Fruit Growers' Exchange and others attacked the reasonableness of a regulation of the Southern Pacific to the effect that in time of car shortage cars will be furnished to the various shippers in proportion to the amount of fruit picked and actually in the packing houses at the time of the demand for cars. Prior to April, 1907, cars were distributed in proportion to the season's business done by the various shippers. This so-called "crop-holding rule" is still in force over the Atchison, but in the case of the Southern Pacific has been displaced by the "house rule" to which objection is taken.

The Commission declares that the situation as described cannot be adequately covered by any fixed, inelastic regulation. Although the crop-holding rule appears to work more perfectly to the satisfaction of shippers and carriers, nevertheless the house rule does not appear to be unduly discriminatory. The complaint was dismissed.

Refusal to Reduce Transcontinental Rates.

In an opinion by Commissioner Clark in the case of the Railroad Commission of Oregon against the Chicago & Alton and others, the Commission has refused to make a low rate from the East to Oregon to compete with rates from California. The complainant asked for a reduction in the rates on denatured alcohol to Oregon points. These rates are already low. Denatured alcohol is manufactured in California and is sold in the north Pacific coast cities at a price which could be met by the eastern product only by reducing the transportation charges to nothing. An effort to place denatured alcohol on a parity with proof spirits would lead either to a large increase in the charges on the proof spirits of a practical wiping out of the charges on the denatured article.

Such increase in the charges on the proof spirits, in the opinion of the Commission, probably would render futile all effort to compete with the California product. The rates complained of were not shown to be unreasonable, unduly discriminatory or unjustly prejudicial. The Commission therefore dismissed the petition.

Private Siding Connection Ordered.

The Commission also, in an opinion rendered by Commissioner Prouty, announced its decision in the case of the McRae Terminal Railway, McRae, Ga., against the Southern and the Seaboard Air Line. This is a supplemental report involving the installation of a connecting track. The Commission decided that the complainant's application for physical connection to its line should be allowed as to the Seaboard Air Line, but not as to the Southern.

In its former report of this case the Commission left details to be agreed on, but no agreement could be reached and a further hearing was had. It is ordered that the Seaboard Air Line shall construct, by January 25, and maintain and operate for two years a "switch connection." * * * The switch used shall be of the value of not less than $50; rails 60-lb., and ties similar to those in a certain side-track near point of connection; but only on condition that by December 20 the McRae Terminal shall pay the Seaboard Air Line $150.

Minimum Carload Rates.

The Commission has announced its decision in the case of the Pacific Purchasing Company against the Chicago & North-Western and others. Complainant ordered several carloads of brass bedsteads to be delivered at Los Angeles from Kenosha, Wis. The initial road was unable to furnish a single car which would hold the minimum weight of brass beds provided for in the tariffs and instead thereof provided two small cars and this resulted in an excess charge of 55 cents per 100 lbs. The Commission holds that the complainant should be awarded reparation. Where three connecting roads publish a joint tariff under which they hold themselves out to the public as prepared to transport commodities in carload lots of a certain minimum magnitude at a certain specified rate such carriers are by their tariff allowed to charge no more than the rate on such carload no matter what cars they may provide for its transportation except as the tariff in specific terms provides certain minimum weights for carloads in cars of certain lengths or capacity.

Penalty for Misrouting—Innocent Carrier Forbidden to Participate

In an opinion by Commissioner Clements the Commission has ordered reparation in the case of the Hennepin Paper Company against the Northern Pacific and the Oregon Short Line, six carloads of paper having been misrouted by the carriers. The Commission says: It is the duty of a carrier, in the absence of routing instructions to the contrary, to forward shipments, having due regard to the interests of the shipper, ordinarily by that reasonable and practicable route over which the lowest charge for the transportation applies; and damage resulting to a shipper from a disregard of this obligation by the carrier can only be repaired by reparation to the extent of the difference between the higher rate applied over the line by which the traffic improperly moved and the lower rate which would have been applied had the freight been properly forwarded.

To require reparation in such a case is only to require the carrier to make just compensation for injury resulting from failure to perform its duty; but to require or permit any other carrier than the one responsible for the misrouting to participate in the making of such reparation would be to permit or require departure from established rates, which is expressly forbidden by law.

Trouble With Low Rates from Crowder City.

In an opinion by Commissioner Clark the Commission has decided 11 cases, most of them against the Missouri, Kansas & Texas concerning a special low rate made on live stock from Crowder City, Ind. T., to Kansas City. The rate was made temporarily, and because of competition, and the complainants ask to have the same reduction made on shipments which were made by themselves from points farther away than Crowder City. If they had paid local rates to that point and then shipped at the special reduced rate from there to Kansas City their total bill would have been smaller than at the regular through rate. The Commission, however, dismissed the complaints, holding that while a through rate that is higher than the sum of the local rates between the same points is prima facie unreasonable, it cannot be reduced to equal such sum of locals except through lawful change in tariff.

The Commission also held that a specific through rate is the lawful rate for a through shipment, even though some combination of rates may make lower, and carrier may not charge the higher through rate upon one shipment and the lower combination rate upon another shipment of the same kind between the same points at the same time.

The Commission further held from the facts disclosed in the record that while a shipper may consign his shipment to a given point, pay charges on same, assume custody and take possession of the property, and, later, reship to another point under rates lawfully applicable to such reshipment, neither a carrier nor an agent of a carrier may act as forwarding or reconsigning agent for a shipper in such manner as to evade or defeat the terms or intent or purpose of the law, and that as no complaint is made against the reasonableness of the specific through rates the demand for reparation is denied and the cases are dismissed.

TRADE CATALOGUES.

Eastward Through the Storied Northwest.—This booklet, which was written by Olin D. Wheeler, contains a description of the places and regions through which the traveler passes on an eastward trip from California over the Shasta Route of the Southern Pacific from San Francisco north to Portland, thence over the Northern Pacific from Portland, through Tacoma, Seattle and Spokane to Minneapolis and St. Paul, including a side trip to Yellowstone Park. There are many interesting photographs showing the mountains, the cities and the country traversed. One of the most striking shows a wall apparently 8 or 10 feet high of California geraniums, another a coasting party descending a glacier on Mt. Hood, and a third a sheep range in Montana. There are several photographs of the Columbia river, which the Northern Pacific will traverse on completion of the Portland & Seattle. On the outside cover are yellow California poppies. The book is issued by the passenger department of the Northern Pacific and contains a clear map of transcontinental territory with the route of the trip shown in heavy lines. It is an example of the best in railroad advertising.

Station Indicators.—The Boynton Indicator Co., Bridgeport, Conn., has issued a pamphlet describing its 1908 models of indicators used for showing in large stations the time and destination of departing trains. This company now makes three styles, the Terminal Sr., the Terminal Jr. and the Local. Patents have been applied for on improvements which are embodied in the 1908 models. In the largest indicators 216 station names can be displayed. In one style it is possible to show 25 station names. The Boynton indicators have been in service for 25 years and the pamphlet gives the names of a number of important roads to which they have been furnished.

Electric Locomotives.—Bulletin No. 4537, of the General Electric Company, Schenectady, N. Y., deals with electric locomotives in heavy passenger and freight work. The points taken up are: rating and capacity, motor cooling by forced ventilation, efficiency, maintenance, annual mileage and mechanical construction. An interesting table gives data on typical machines built by the company since 1894, showing the operating voltage, horse-power, maximum tractive effort, etc. The rest of the pamphlet consists of drawings and important figures and charts showing speed, horse-power and tractive effort of 11 engines in weight from 17 tons to 150 tons.

Santa Fe Employees' Magazine.—The second volume begins with the December number. This magazine appears to be growing in size and excellence. A history of the motive power of the Santa Fe constitutes the leading article. A Christmas at the Grand Canyon is an entertaining account, by Sharlot M. Hall, of a Christmas spent at this wonderful place in wilderness days, reprinted from *Out West.* Teamwork-Mail Department, The Gospel of Safety, The Alleged Rebate Case, Reporting Engine Failures, The "Thrack" Department, and Air-Brake Department are shorter articles.

New Orleans, the Gulf Coast and Florida.—The passenger department of the Louisville & Nashville publishes an exceedingly interesting and attractive pamphlet which contains descriptions and half-tone reproductions of New Orleans and the towns along the Gulf. The Mississippi Sound winter resorts are comparatively little known, and the illustrations in the pamphlet help convey an idea of their quaint charm.

Tie Plates.—"Economy" tie plates are shown in an 8½-in. x 11-in., 12-page pamphlet issued by the Spencer Otis Co., Chicago. There are eight styles, all of rolled steel. They differ in the style of ribbing or of corrugations on top, in the number and direction of flanges on the bottom, and in the presence or absence of shoulders. Suggestions for punching the different styles are made.

Mexico-St. Louis Special.—This semi-weekly solid through Pullman train between St. Louis and the City of Mexico is being advertised by a mailing card giving briefly the route, schedule and other facts. The interested lines are the St. Louis, Iron Mountain & Southern, the Texas & Pacific, the International & Great Northern and the National Lines of Mexico.

"Universal" Portland Cement.—Bulletin 43 of the Universal Portland Cement Co., Chicago, shows a number of important engineering works or structures in which this cement is used.

MANUFACTURING AND BUSINESS.

The Jeffrey Manufacturing Co., Columbus, Ohio, has opened a branch office at 924-925 Pierce building, St. Louis, Mo.

The Wisconsin Engine Co., Corliss, Wis., has been awarded the contract for a 20,000,000-gal. pumping engine by the city of Atlanta, Ga.

J. P. Jackson, Professor of Electrical Engineering at the Pennsylvania State College, has been appointed Dean of the School of Engineering of the college.

At a meeting on December 18 the directors of the New York Air Brake Co., New York, decided to defer action on the quarterly dividend, which has been 2 per cent. since 1899.

The Dominion Iron & Steel Company, Montreal, Que., has acquired control of the Cumberland Railway & Coal Company, which owns coal deposits said to amount to 150,000,000 tons.

The Westinghouse Air-Brake Co., Pittsburgh, Pa., has declared the usual quarterly dividends of 2½ per cent. regular and 2½ per cent. extra on the $11,000,000 capital stock. At the same time a stock dividend of 25 per cent. will be distributed.

The San Francisco, Cal., office and storeroom of the Independent Pneumatic Tool Co., Chicago, has been moved from 11 Front street to larger quarters at 61 Fremont street, where a full line of Thor pneumatic tools and parts will be carried in stock.

The Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa., has been given the contract for electrifying a standard gage road running from El Ora, Mex., to mines nearby. The road will be operated by electric locomotives built by the Westinghouse company and the Baldwin Locomotive Works.

W. M. Lalor, Electrical Engineer and Assistant to Vice-President Dickinson, of the Bliss Electric Car Lighting Co., Milwaukee, Wis., has gone to Chili to supervise the installation of a number of Bliss axle light equipments to new passenger cars of the Chilian State Railroads and to secure additional business in South American countries.

The works of the Weston Electrical Instrument Co., Waverly Park, Newark, N. J., will be shut down from December 21, 1907, to January 2, 1908, for the annual stock taking and repairs to plant. Part of the office and shipping departments will, however, remain in operation and therefore urgent orders for standard goods can be promptly shipped during this period.

The Pantasote Co., New York, is putting on the market its new Agosote car head lining. This head lining is now made in England, but the company expects soon to be able to supply all orders from the products of its own mill in this country. It is made in sheets ⅛ in., 3/16 in. and ¼ in. thick, and is furnished shaped to conform to the curves of the upper and lower decks.

S. W. Midgley, formerly General Sales Representative of the National Car Coupler Co., Chicago, has been made Western Representative of the Curtain Supply Co., Chicago, with headquarters in Chicago. Mr. Midgley succeeds R. F. Hayes, who takes charge of the New York office, with the title of Eastern Manager, succeeding A. L. Whipple, who recently resigned to go to another company.

McCarthy racks, made by the Rostand Manufacturing Co., Milford, Conn., have been specified for the 100 coaches being built for the New York, New Haven & Hartford by the Bradley Car Works; the 20 coaches for the Boston & Maine being built by the Laconia Car Co.; the 25 coaches for the Chicago & North-Western being built by the Pullman Co., and the 30 coaches for the Central of New Jersey being built by Harlan & Hollingsworth. The company built a new factory at Milford about two years ago and since removal there from New Haven several additions to the new plant have been made. About a year ago a brass foundry was added. This branch of the business has also increased so rapidly as to require recent enlargement in facilities.

H. W. Clapp, special representative of the railroad engineering and construction departments of the General Electric Company, Schenectady, N. Y., is about to go to San Francisco, having been appointed to an office in the electrical department of the Southern Pacific. An informal luncheon was given him at the Engineers' Club, New York, on December 14, by officers of the General Electric Company, the New York Central & Hudson River, the Interborough Rapid Transit, the New York City Railway and members and officers of several engineering firms and supply companies. During the five and one-half years he has spent in New York, Mr. Clapp has been particularly concerned with the installation and operation of rolling stock for the electrified part of the New York Central, and the cars for the Interborough Rapid Transit. He also equipped the cars for the West Jersey & Seashore. He is a son of F. Boardman Clapp, Managing Director of the Melbourne (Australia) Tramway & Omnibus Co. Before coming to America Mr. Clapp was for four years Superintendent of Motive Power of the Brisbane Tramway Co., Brisbane, Australia.

Iron and Steel.

No large new orders of rails for 1908 delivery have yet been announced, although it is understood that negotiations are actively under way for a large tonnage. The Pennsylvania has replaced

orders for about 15,000 tons of rails, the orders for which had been postponed. It is understood that this order was divided among a number of companies. The rails are to be made according to the Pennsylvania's new specifications, which are about the same as those recommended by the American Society of Civil Engineers. The Union Pacific is said to have re-entered an order for 35,000 tons for which reservation had been made, and it is understood that the Erie is in the market for 35,000 tons.

OBITUARY NOTICES.

Lord Kelvin died in Glasgow, Scotland, on December 17 after several weeks illness.

Luman F. Parker, General Solicitor of the St. Louis & San Francisco, died last Monday.

M. Hopkins, President and General Manager of the South Side Elevated Railroad, Chicago, died Dec. 7 of pneumonia. Prior to his connection with the elevated railroad he was with the Chicago & North-Western for 30 years, starting as brakeman in 1863 and working up to Superintendent of the Iowa division. He resigned this position in 1893 and became General Manager of the Chicago & South Side Rapid Transit Railroad the same year. The following year he was made President and continued as such until October, 1895, when he was appointed Receiver of the property. At the termination of the receivership he was made General Manager of the reorganized company, and in January, 1907, was elected also President. He was 63 years old.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, etc., see advertising page 24.)

New York Railroad Club.

The next meeting of the New York Railroad Club will be held at the building of the Engineering Societies, 29 West 39th street, December 20. Instead of the usual paper, there will be a smoker, vaudeville entertainment and luncheon.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Georgia & Florida.—J. M. Wilkinson has been elected Third Vice-President.

Lehigh & New England.—W. A. Lathrop, President of the Lehigh Coal & Navigation Company and Vice-President of the Lehigh & New England, has been elected President of the Lehigh & New England, succeeding W. J. Turner, who will become Vice-President and General Counsel.

New York, New Haven & Hartford.—C. F. Choate has resigned from the Board of Directors.

Pere Marquette.—William Cotter, General Manager, has been elected President. The temporary Board of Directors of the reorganized company is as follows: George W. Perkins, H. F. Shoemaker, George W. Young, W. T. Cross, E. H. Harriman, Charles Steele, F. D. Underwood, G. A. Richardson, George F. Baker, Norman B. Ream, I. G. McCullough, Walter B. Horn, Allen Wardwell and Thomas W. Joyce, all of New York, and Frederick W. Stevens, of Detroit.

Portland & Seattle.—F. B. Clarke, formerly Traffic Manager of the Great Northern, has been appointed Assistant to the President of the Portland & Seattle.

Pullman Company.—George F. Brown, Treasurer, has been retired on pension after 36 years of service. K. Demmler, Assistant Secretary and Assistant Treasurer, succeeds Mr. Brown. C. S. Sweet, Secretary to the President, has been made Assistant to the President. R. C. Kelly has been appointed Assistant Treasurer. Mr. Brown began work with the company in 1871 as Assistant to the General Superintendent, following four years in railroad service as Secretary and Treasurer to the Receiver of the Memphis, Clarksville & Louisville, now part of the Louisville & Nashville, and then as agent in the freight department of the Illinois Central. He was successively Acting General Superintendent, General Superintendent and General Manager of the Pullman Company, and of late years he has been Treasurer. He is 64 years old.

Silver Peak.—The officers of this company are as follows: President, G. T. Oliver, and Vice-President, William Flinn, both with office at Pittsburgh, Pa. General Manager, M. L. Effinger, and General Freight and Passenger Agent, F. L. Voorhees, both with office at Blair, Nev. The road is 18 miles long, connecting with the Tonopah & Goldfield at Blair Junction.

Operating Officers.

Ann Arbor.—W. F. Bradley, Superintendent at Toledo, Ohio, has resigned.

Ashland & Western.—E. D. Taylor has been appointed General Manager.

Chicago & North-Western.—See Peoria & Pekin Union.

Halifax & Southwestern.—James Bain, Superintendent of the Quebec & Lake St. John, has been appointed Superintendent of the Halifax & Southwestern, with office at Bridgewater, N. S.

Lehigh Valley.—W. W. Abbott has been appointed Trainmaster at Jersey City, N. J., succeeding G. W. Hardcastle, resigned.

New York, New Haven & Hartford.—A. R. Horn, Assistant Superintendent of the Western division, has been appointed Assistant Superintendent of the New York division, succeeding Andrew Ross, transferred to the Harlem River terminal.

John B. Gallery, general yardmaster of the Northern Pacific at Duluth, Minn., has been appointed Assistant Superintendent of the Western division of the New York, New Haven & Hartford, with office at Providence, R. I.

Northern Alabama.—O. K. Cameron, chief train despatcher of the Memphis division of the Southern, has been appointed Trainmaster of the Northern Alabama, with office at Sheffield, Ala., succeeding J. Y. Hill, promoted. See Southern under engineering and rolling stock officers.

Pan-American.—H. A. McCulloch, Assistant General Manager, has resigned to become General Manager of the Guayaquil & Quito in Peru.

Peoria & Pekin Union.—R. H. Johnson, Superintendent of Freight Terminals of the Chicago & North-Western at Chicago, has been appointed General Manager of the Peoria & Pekin Union.

Quebec & Lake St. John.—See Halifax & Southwestern.

Southern.—R. E. Simpson, Superintendent of the Spartanburg division, has been appointed Superintendent of the Asheville division, with office at Asheville, N. C., succeeding A. Ramseur, resigned. The Spartanburg division will hereafter be operated as part of the Columbia division, of which H. A. Williams is Superintendent, with office at Columbia, S. C.

G. A. Bradley, Trainmaster at Atlanta, Ga., has been appointed Superintendent of Terminals at that place, succeeding W. M. Deuel, promoted.

Southern Pacific.—E. S. Luty, Trainmaster at Ogden, Utah, has been appointed Trainmaster of the First district, including Ogden yard, of the Salt Lake division of the Lines East of Sparks, with office at Ogden, Utah. John McCarty, Trainmaster at Mina, Nev., has been appointed Trainmaster of the Second district, including the Montello and Carlin yards, with office at Montello, Nev. B. A. Campbell, Trainmaster at Sparks, Nev., has been appointed Trainmaster of the Third and Fourth districts, including the Winnemucca, Hazen and Sparks yards, with office at Winnemucca, Nev. The office of Trainmaster at Mina, with authority over the Sixth, Seventh and Eighth districts, is now vacant.

Traffic Officers.

Chicago & Alton.—W. L. Ross, General Freight and Passenger Agent of the Toledo, St. Louis & Western, has been appointed General Traffic Manager of that road and of the Chicago & Alton. The authority of George J. Charlton, General Passenger and Ticket Agent of the Alton, and of C. A. King, General Freight Agent of the Alton, has been extended over the Toledo, St. Louis & Western.

Chicago, Rock Island & Pacific.—H. S. Ray, Assistant General Passenger Agent at St. Louis, has been transferred to the Chicago office, in charge of the Advertising Department, and his former office has been abolished, effective January 1. G. B. Albright, Assistant General Freight Agent at St. Louis, has been appointed Assistant General Freight Agent at Kansas City, Mo., succeeding K. M. Wharry, resigned to go to the Missouri Pacific. The authority of H. H. Embery, General Freight Agent of the lines west of Missouri, has been extended to cover the line from Kansas City, Mo., to St. Louis.

International & Great Northern.—George D. Hunter, Assistant General Passenger and Ticket Agent, has been appointed General Eastern Freight and Passenger Agent, with office at New York. R. E. Lee, chief clerk in the passenger department, succeeds Mr. Hunter, with office at Palestine, Tex.

Oregon Short Line.—E. E. Buckingham, General Superintendent,

has resigned to become General Manager of the South Omaha stock yards.

San Pedro, Los Angeles & Salt Lake.—Allen Walbauer, General Agent of the freight and passenger departments at Pittsburgh, Pa., has resigned, effective January 1.

Toledo, St. Louis & Western.—See Chicago & Alton.

Engineering and Rolling Stock Officers.

Canadian Northern.—G. S. McKinnon has been appointed Assistant Master Mechanic, with office at Winnipeg, Man.

Duluth & Iron Range.—Wayne A. Clark, Assistant Engineer, has been appointed Chief Engineer, succeeding Robert Angst, deceased.

Manistee & Northeastern.—E. H. O'Neil has been appointed to the new office of Assistant to the General Superintendent.

New York Central & Hudson River.—F. E. Paradis has been appointed to the new office of Engineer of the Western district, with office at Buffalo, N. Y., in charge of new construction west of Minoa, N. Y. B. A. Cunningham and F. F. Gordon have been appointed Assistant District Engineers at Buffalo, and D. K. Van Ingam, Assistant District Engineer at Syracuse. A. M. Holcomb, Resident Engineer at Syracuse, has been appointed Engineer of the Eastern district, in charge of the construction between Minoa and Richland, with office at Albany. R. P. Horton and R. E. Dougherty have been appointed Assistant Engineers of the Eastern district. Mr. Paradis and Mr. Holcomb will report to F. B. Freeman, Engineer of Construction, whose office is at New York. The appointments are effective January 1.

Southern.—J. Y. Hill, Trainmaster of the Northern Alabama, has been appointed Engineer of Maintenance of Way of the Southern, with office at Birmingham, Ala.

Special Officers.

Pennsylvania.—Ivy L. Lee, of the firm of Parker & Lee, New York, who have been acting as publicity agents of the Pennsylvania and other roads, is to go to the Pennsylvania on January 1 in charge of similar work.

LOCOMOTIVE BUILDING.

L. J. Smith, Kansas City, Mo., has ordered two four-wheel (0-4-0) switching engines, cylinders 15 in. x 20 in., with both saddle tank and trailing tank, from the Davenport Locomotive Works. These locomotives are equipped with two 9½-in. Westinghouse pumps, one on each side, and special air capacity for both automatic and straight air-brakes, as well as for pneumatic dumping device for dump cars.

The Porto Rico Railway Company, through J. G. White & Co., New York, have ordered three 10-wheel (4-6-0) locomotives from the Baldwin Locomotive Works.

General Dimensions.

Weight, total	90,000 lbs.
Weight on drivers	80,000 "
Cylinders	17 in. x 22 in.
Diameter of drivers	44 in.
Boiler, type	Straight top
" diameter	54 in.
" steam pressure	160 lbs.
Heating surface, total	1,050 sq. ft.
Gage	1 meter.

The Tehuantepec National has ordered eight simple consolidation (2-8-0) oil burning locomotives from the Baldwin Locomotive Works.

General Dimensions.

Type of locomotive	Consolidation
Weight, total	134,000 lbs.
Weight, on drivers	118,000 "
Cylinders	20 in. x 26 in.
Diameter of drivers	56 in.
Boiler, type	Belpaire
" working steam pressure	180 lbs.
" heating surface, total	1,847 sq. ft.
" number of tubes	239
" diameter of tubes	2 in.
" length of tubes	13 ft. 8 in.
Firebox, length	107⅝ "
Firebox, width	33⅜ "
Grate area	24.94 sq. ft.
Tank capacity	4,000 gals.
Oil capacity	2,000 gals.

Special Equipment.

Air-brakes	Westinghouse
Couplers	Janney
Headlights	Pyle National electric
Injector	Sellers
Journal bearings	Phosphor bronze
Piston rod packings	Swain
Valve rod packings	Swain
Safety valve	Crosby
Sanding devices	Leach
Sight-feed lubricators	Michigan
Steam gages	Ashcroft
Tires, driving wheel	Latrobe

The Toronto, Hamilton & Buffalo, as reported in the *Railroad Gazette* of November 1, has ordered one simple six-wheel switching (0-6-0) locomotive, one simple ten-wheel passenger (4-6-0) locomotive, and one simple ten-wheel freight (4-6-0) locomotive from the Montreal Locomotive & Machine Company for March, 1908, delivery. The specifications are as follows:

General Dimensions.

	10-wheel freight.	10-whl. passenger.	6-whl. switching.
Type of locomotive	10-wheel freight.	10-whl. passenger.	6-whl. switching.
Weight, total	246,000 lbs.	294,000 lbs.	195,000 lbs.
Weight on drivers	141,000 "	183,000 "	121,000 "
Diameter of drivers	60 in.	73 in.	51 in.
Cylinders	19 in. x 26 in.	20 in. x 26 in.	19 in. x 26 in.
Boiler, type	Ext. wagon top.	Ext. wagon top.	Straight top.
" wkg stm press.	200 lbs.	200 lbs.	180 lbs.
" number tubes	279	336	250
" material tubes.	Diamond.	Nat'l Diamond,	Nat'l Diamond.
" diam. tubes	2 in.	2 in.	2 in.
" length tubes	14 ft.	15 ft. ½ in.	11 ft.
" staybolts	.....	.....*	.....
Firebox, length	96 in.	102 in.	102 in.
" width	41 in.	65¼ in.	33 in.
" maker	Carnegie Steel Co.	Carnegie Steel Co.	Carnegie Steel Co.
" grate area	27.3 sq. ft.	46.0 sq. ft.	23.4 sq. ft.
Heating surface, total.	2,157.0 sq. ft.	2,791.0 sq. ft.	1,620.0 sq. ft.
Tank capacity	5,000 gals.	5,500 gals.	3,500 gals.
Coal capacity	9 tons.	9 tons.	5 tons.

Special Equipment.

Air-brakes	Westinghouse.	Westinghouse.	Westinghouse also straight air.
Axles	Hammond open-hearth steel.	Nova Scotia Steel Co.	Nova Scotia Steel Co.
Balance valve	.....	Richardson.	.....
Bell ringer	Gollmar.	Gollmar.	Simplicity.
Boiler lagging	Sect'nal magnesia.	Sect'nal magnesia.	Asbestos.
Brake-beams	Monarch.	Monarch.	Monarch.
Brake-shoes	American Brake-Shoe & Foundry Co.		
Couplers	Climax.	Climax.	Climax.
Headlight	Buffalo.	Buffalo.	Buffalo.
Injector	Nathan.	Nathan.	Nathan.
Journal bearings	Canadian bronze.	Canadian bronze.	Canadian bronze.
Piston rod packings	Hayden.	Hayden.	Hayden.
Valve gear	.....	Walschaert.	.....
Valve rod packings	Hayden.	Hayden.	Hayden.
Safety valves	Hayden.	Hayden.	Hayden.
Sanding devices	Wilson.	Wilson.	Wilson.
Sight feed lubricators.	Nathan.	Nathan.	Nathan.
Springs	Montreal St'l Wks.	Montreal Sp'g Co.	Montreal Sp'g Co.
Steam gages	Star.	Star.	Star.
Steam heat equipment.	.....	Gold.	.....

*Four rows flexible staybolts in breaking zone.

CAR BUILDING.

The New York, New Haven & Hartford has ordered 100 passenger coaches from the Bradley Car Works.

The Havana Central is said to have ordered fifty 36-ft. box cars of 60,000 lbs. capacity from the McGuire-Cummings Manufacturing Co. Up to the time of going to press we have not been able to confirm this item.

The Barrett Manufacturing Company, Chicago, is said to have ordered 40 tank cars of 60,000 lbs. capacity from the Cambria Steel Company. Up to the time of going to press we have not been able to confirm this item.

The Tehuantepec National is said to have ordered three baggage cars, two first class passenger cars and five third class passenger cars from the Pullman Company. Up to the time of going to press we have not been able to confirm this item.

The Boston & Maine, as reported in our advance sheet of December 11, has ordered 20 vestibule coaches from the Laconia Car Company for May and June, 1908, delivery. These cars will have a seating capacity for 72 passengers, will weigh 80,000 lbs., and will measure 59 ft. 2 in. long and 9 ft. wide, inside measurements, and 68 ft. 2½ in. long over coupling line, 10 ft. 2¼ in. wide over eaves and 14 ft. 4 in. high over all. The bodies and underframes will be of wood. The special equipment includes:

Bolsters	Commonwealth
Brake-beams	Buffalo
Brake-shoes	American Brake-Shoe & Foundry Co.
Brakes	Westinghouse
Brasses	Boston & Maine standard
Couplers	Tower
Curtain fixtures	Forsyth
Curtain material	Pantasote
Door fastenings	Boston & Maine standard
Doors	Boston & Maine standard
Draft rigging	Gould
Dust guards	Flexible
Heating system	Chicago-Vapor
Light	Pintsch
Paint	Boston & Maine standard
Platforms	Gould
Seats	Haywood Bros. & Wakefield Co., Boston
Trucks	Commonwealth, four-wheel
Vestibules	Gould
Wheels	Midvale-Allen

RAILROAD STRUCTURES.

Alexandria, La.—Local reports say that work will be begun this month on the union passenger station here.

Atlanta, Ga.—The Georgia Railway & Electric Company has asked permission to replace the present bridge over the Western & Atlantic with a new structure.

PORT ARTHUR, ONT.—The Canadian Pacific will probably build a new dock in front of its passenger station here next year.

PORT HURON, MICH.—The Grand Trunk shops here are to be enlarged.

WINNIPEG, MAN.—The Canadian Northern, it is said, is to put up a power house at Fort Rouge, to cost $25,000, and a foundry to cost $30,000.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ASHLAND & WESTERN.—See Lorain, Ashland & Southern.

BOSTON ELEVATED.—This company during the year built two miles of line from Guild street to a point near Forest Hills, Boston. Surveys are under way from Sullivan square, Charlestown, to Malden, about three miles.

BRITISH COLUMBIA (ELECTRIC).—This company, it is said, has bought the charter for a proposed electric line to run from Vancouver, B. C., south to Blaine, Wash., about 40 miles. This is to form part of a proposed electric line from Vancouver south to Seattle, Wash. R. H. Sperling, Superintendent, Vancouver, B. C.

CANADIAN NORTHERN.—The connecting line from Brandon, Man., via a point on the Hartney Junction-Virden line south of Virden west to Regina, Sask., 175 miles, was officially opened on December 11.

CANADIAN PACIFIC.—An extension of the Pheasant Hills branch is now in operation from Strassburg, Assin., north and west to Saskatoon. The Canadian Pacific therefore now has a line from Winnipeg, Man., west via Kirkella, Assin., to Saskatoon.

CANANEA, YAQUI RIVER & PACIFIC.—See Southern Pacific.

CHESAPEAKE & OHIO.—Contracts have been let to Carpenter, Frazier, Haley & Co., of Clifton Forge, Va., and work is now under way extending the Coal River Railway from Peytona, W. Va., northeast to Racine, two miles; Madison southeast to Laurel, 12 miles; Laurel, southeast to Sang, five miles, and a branch from Laurel northeast five miles.

CHICAGO, MILWAUKEE & ST. PAUL.—Work, it is said, has been started by this company elevating its tracks in the south side of Milwaukee. The cost of the improvements will be between $500,000 and $750,000.

CHICAGO, ROCK ISLAND & PACIFIC.—Reports from Colorado Springs say that this company is preparing to build into Denver. At present its trains reach that city over the Denver & Rio Grande and the Union Pacific, using the track of the Rio Grande between Denver and Pueblo, 119.60 miles, and over the U. P. between Denver and Limon, 89.78 miles. It is said that between Denver and Colorado Springs preliminary surveys have been made, although the officers of the company refuse to confirm the report. Options are being secured on land in Denver for terminal grounds.

COAL RIVER.—See Chesapeake & Ohio.

DENVER, NORTH-WESTERN & PACIFIC.—This road has been extended from Kremmling, Colo., west to Yarmony, 19.7 miles. Work is under way by Orman & Crook, of Denver, Colo., extending the road from Yarmony to Steamboat Springs, 68 miles. Steamboat Springs is about 340 miles from Salt Lake City. The road is now built from Denver, 147 miles west.

GEORGIA ROADS (ELECTRIC).—According to reports from Atlanta, a number of residents of that place in conjunction with B. F. Yoakum are planning an electric line from Atlanta south to Albany, 180 miles.

INDIANA ROADS.—A number of St. Louis and eastern capitalists are planning to build a through line from Terre Haute, Ind., southwest via Chester, Ill., to a point in Missouri, 100 miles west of Chester, about 285 miles, through an oil and fruit and coal section in Illinois. The plans include securing control of existing lines from Mount Vernon, Ill., southwest to Chester, about 60 miles, also a line in Missouri about 60 miles long, and to build 125 miles from Mount Vernon northeast to Terre Haute, and about 40 miles in Missouri.

INDUSTRIAL OF LORAIN.—See Lorain, Ashland & Southern.

INTERBOROUGH RAPID TRANSIT (NEW YORK CITY).—This company during the past year, on its subway division, has added .375 miles of new line, from 221st street to 230th street, on Broadway. The company has under construction 3.51 miles, as follows: from 230th street on the Broadway division to Van Cortland Park, one mile; from Bowling Green in the Borough of Manhattan to Atlantic avenue in the Borough of Brooklyn, 2.51 miles. The work is being done by the Rapid Transit Subway Construction Company.

LORAIN & ASHLAND.—See Lorain, Ashland & Southern.

LORAIN, ASHLAND & SOUTHERN.—The Lorain & Ashland, organized by Joseph Ramsey, Jr., and associates to build a line from Lorain, Ohio, south via Wellington to the Ohio river, of which 22 miles from Lorain was finished last year, is said to have secured control of the Ashland & Western, operating a road from Ashland, Ohio, southeast to Custaloga, 25 miles. This road is to be consolidated with the Industrial Railroad of Lorain and the Lorain & Ashland under the name of the Lorain, Ashland & Southern. The consolidated company will have $3,000,000 capital. About $1,000,000 is to be spent in extensions, terminals and equipment next spring. The new line is to form part of the proposed line from Lorain south to the Ohio river. (Oct. 4, p. 403.)

LOS ANGELES & REDONDO (ELECTRIC).—This company, which was formerly a steam railroad, during the last year has built 8.64 miles of road, as follows: from 48th street and Gardiner division to Arlington avenue, 1.74 miles; from Los Angeles to Strawberry Park, 6.9 miles.

MANISTIQUE RAILWAY.—This company, which operates 52 miles of railroad in Michigan, has during the past year added 32 miles of sidings and spurs.

MEXICAN-PACIFIC COAST.—See Southern Pacific.

MINNEAPOLIS & RAINY RIVER.—This company is building with its own forces an extension from Big Fork, Minn., north to Second Crossing, 11½ miles. Grading is finished for 9.2 miles.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—Work is under way by Foley Bros., Larsen & Co., on the extension from Brooten, Minn., north to Duluth, 189 miles.

MINNESOTA TRANSFER RAILWAY.—This company, operating a terminal switching road of 67 miles for railroads entering St. Paul and Minneapolis, during the year added 11.89 miles of side tracks.

MORGAN'S LOUISIANA & TEXAS.—See Southern Pacific.

NEBRASKA, KANSAS & SOUTHERN.—Surveys are reported made by this company from Stockton, Kan., southwest to Garden City, 165 miles. Rights of way have been secured in Finney and Hodgeman counties and work will shortly be started in Ness county. Surveys are to be continued northeast to Superior, Neb., 80 miles. Construction work will be started on this end of the line when work is well under way on the section from Stockton to Garden City. F. T. Burnham, Secretary, Beloit, Kan. See Nebraska, Kansas & Southwestern. (March 15, p. 387.)

PACIFIC & IDAHO NORTHERN.—Surveys are being made for an extension from Evergreen, Idaho, east to Roseberry, 35 miles.

PORTLAND & SEATTLE.—Contract let to Siems & Shields, of St. Paul, Minn., for building a 10-mile section of this road from Vancouver, Wash., south to Portland, Ore. Work is now under way.

PORT SIMPSON & SKEENA RIVER.—Under this name a company is being formed by Colonel C. J. Prior, of Victoria, B. C., and associates to build a line from Port Simpson, B. C., east to a point on the Skeena river, about 200 miles.

SOUTHERN PACIFIC.—Morgan's Louisiana & Texas is building from Lafayette, La., to Baton Rouge, 52 miles; from Eunice to Mammau, 10 miles, and from Bayou Sale to South Bend, 10 miles.

An officer of the Cananea, Yaqui River & Pacific writes that this company during the year built about 102 miles in Sonora. Work is now under way from Cumuripa, Sonora, north to the international boundary, 345 miles; from a point on the Naco-Cananea line at Del Rio, Sonora, northwest to Nogales, 75 miles, and from Nacozari, Sonora, south to Rio Yaqui, 108 miles.

The Mexican-Pacific Coast Railway under a concession granted this company is building from San Blas, Sinaloa, southeast to Guadalajara, 650 miles.

The new double-track Bay Shore cut-off has been formally opened. The new line runs from San Bruno, Cal., north to San Francisco, 9.84 miles, and has easy grades.

WABASH.—This company has completed work changing the alinement and grading on its line over the Sangamon river east of Decatur, Ill., and the second-track has been put in use. The work, which was very heavy, included a fill requiring the moving of 700,000 cu. yards of earth; also a concrete bridge 654 ft. long and 84 ft. high with four arches. This work is part of the plan to double-track the entire line between St. Louis and Chicago.

RAILROAD CORPORATION NEWS.

ATLANTIC COAST LINE.—The directors have declared the regular semi-annual dividend of 3 per cent. on the $47,537,600 outstanding common stock. The dividend will be paid in certificates of indebtedness bearing 4 per cent. interest. Each holder of 33⅓ shares of common stock will receive $100 in 4 per cent. cer-

tificates of indebtedness. Non-interest-bearing certificates will be issued in fractional amounts, which will be exchangeable for 4 per cent. certificates of indebtedness when presented at the Safe Deposit & Trust Co. of Baltimore in amounts of $100. The trust company will, if notified before January 6, buy fractional amounts only, at 75 per cent. of their face value, or will sell at the same price sufficient fractional amounts to make up the required amount of $100.

CHICAGO, PEORIA & ST. LOUIS.—The July, 1907, interest on the $2,000,000 consolidated mortgage 5 per cent. 30-year bonds was paid on December 10. The two preceding semi-annual interest payments were similarly delayed.

LAKE ERIE & WESTERN.—A dividend of 1 per cent. on the $11,840,000 6 per cent. non-cumulative preferred stock has been declared payable January 15, 1908. The company has been paying 3 per cent. annually on this stock for the last four years, paying 2 per cent. in January and 1 per cent. in July.

The income results, partly estimated, of the Lake Erie & Western, including the Northern Ohio, for the year ending December 31, 1907, are given below:

Year Ending Dec. 31, 1907.			
Earnings	$5,112,400	Dec.	$100,400
Expenses (75.53 per cent.)	3,861,500	Inc.	1,200
Net earnings	$1,250,900	Dec.	$101,600
Other income	5,900	"	5,800
Gross income	$1,256,800	"	$107,400
First charges and taxes	975,200	"	25,900
Available for dividend	$281,600	"	$81,500
Dividend (2 per cent.)	236,800	"	118,400
Surplus.	$44,800	Inc.	$36,900

LAKE SHORE & MICHIGAN SOUTHERN.—The regular semi-annual dividend of 6 per cent. and an extra dividend of 2 per cent. on the $49,466,500 stock have been declared, payable January 29.

The following are the income results, partly estimated, for the six months and the year ended December 31, 1907:

Six Months Ending Dec. 31, 1907.			
Earnings	$23,428,700	Inc.	$1,491,400
Expenses (76.24 per cent.)	17,861,900	"	1,597,200
Net earnings	$5,566,800	Dec.	$105,800
Other income	3,150,000	Inc.	646,500
Gross income	$8,716,800	"	$540,700
First charges and taxes	4,435,000	"	329,500
Available for dividend	$4,281,800	"	$211,200
Dividend (6 per cent.) $2,968,000			
Extra dividend (2 per cent.) 989,300			
	3,957,300	"	989,300
Surplus	$324,500	Dec.	$778,100
Year Ending Dec. 31, 1907.			
Earnings	$45,018,200	Inc.	$2,473,800
Expenses (75.91 per cent.)	34,175,200	"	1,499,400
Net earnings	$10,843,000	"	$974,400
Other income	5,100,000	"	946,500
Gross income	$15,943,000	"	1,920,900
First charges and taxes	8,641,600	"	1,106,100
Available for dividends	$7,301,400	"	$814,800
Dividend (12 per cent.) $5,936,000			
Extra dividend (2 per cent.) 989,300			
	6,925,300	"	1,978,700
Surplus.	$376,100	Dec.	$1,163,900

MICHIGAN CENTRAL.—The regular semi-annual dividend of 3 per cent. and an extra dividend of 2 per cent. on the $18,738,000 stock have been declared, payable January 29.

The following tables show the income results, partly estimated, for the six months and the year ending December 31, 1907:

Six Months Ending Dec. 31, 1907.			
Earnings	$14,752,400	Inc.	$1,096,000
Expenses (80.15 per cent.)	11,823,600	"	427,300
Net earnings	$2,928,800	"	$668,700
Other income	287,600	"	86,000
Gross income	$3,216,400	"	$754,700
First charges and taxes	2,235,700	"	256,600
Available for dividend	$980,700	"	$518,100
Dividend (3 per cent.) $562,100			
Extra dividend (2 per cent.) 374,800			
	936,900	"	374,800
Surplus.	$43,800	Inc.	$143,300
Year Ending Dec. 31, 1907.			
Earnings	$28,586,400	Inc.	$2,310,800
Expenses (81 per cent.)	23,155,100	"	1,424,800
Net earnings	$5,431,300	"	$886,000
Other income	538,200	"	136,200
Gross income	$5,969,500	"	$1,022,200
First charges and taxes	4,351,200	"	391,700
Available for dividend	$1,618,300	"	630,500
Dividend (6 per cent.) $1,124,200			
Extra dividend (2 per cent.) 374,800			
	1,499,000	"	562,100
Surplus	$119,300	Inc.	$68,400

CHICAGO, ROCK ISLAND & PACIFIC.—A quarterly dividend of 1 per cent. on the $74,854,100 capital stock has been declared payable January 2, 1908. In 1907 5½ per cent. was paid, in 1906 6 per cent., in 1905 6¼ per cent., and in 1904 8¼ per cent.

ILLINOIS CENTRAL.—Arguments were heard this week before Judge Bull in the Superior Court of Illinois on dissolving the injunction preventing the voting of the Illinois Central held by the Railroad Securities Company and the Union Pacific. It was announced that Stuyvesant Fish has been given proxies for $180,500 of Illinois Central stock held by the Rothschilds.

NEW YORK CENTRAL & HUDSON RIVER.—The general balance sheet, as of September 30, 1907, shows loans and bills payable of $25,192,000, as compared with $8,154,000 at the same time in 1906, while in 1905 and in 1904 the amount was less than $3,000,000. The $25,000,000 three-year notes issued February 1, 1907, are probably included under this head. The special improvement fund was $1,282,488, which compares with $881,720 last year. The cost of road and equipment is given as $214,369,326, an increase of $11,914,431, and securities owned, $154,596,380, an increase of $4,733,654. The bonded debt remains the same while the capital stock outstanding amounts to $178,632,000, as compared with $149,197,800 last year. The surplus on hand was $14,707,483, a decrease of $2,140,979.

The following are statements of the income account, partly estimated, for the quarter and the year ending December 31, 1907:

Quarter Ending Dec. 31, 1907.			
Earnings	$24,712,500	Inc.	$284,900
Expenses (79.49 per cent.)	19,644,600	"	1,452,700
Net earnings	$5,067,900	Dec.	$1,167,800
Other income	3,841,400	Inc.	948,700
Gross income	$8,909,300	Dec.	$219,100
First charges and taxes	5,944,900	"	47,100
Available for dividend	$2,964,400	"	$172,000
Dividend (1.50 per cent.)	2,679,500	Inc.	441,500
Surplus.	$284,900	Dec.	$613,500
Year Ending Dec. 31, 1907.			
Earnings	$98,713,200	Inc.	$6,623,400
Expense (76.61 per cent.)	75,624,700	"	9,362,700
Net earnings	$23,088,500	Dec.	$2,739,300
Other income	11,276,000	Inc.	3,568,300
Gross income	$34,364,500	"	$829,000
First charges and taxes	23,318,300	"	750,400
Available for dividend	$11,046,200	"	$78,600
Dividend (6 per cent.)	16,717,900	"	2,885,000
Surplus.	$328,300	Dec.	$2,806,400

NORFOLK & SOUTHERN.—This company, it is said, has sold $700,000 three-year 6 per cent. collateral trust notes dated October 1, 1907, and due November 1, 1910, subject to call on any interest day at 102½ and interest, being part of an authorized issue of $2,750,000. It is also said that a syndicate has agreed to take $1,000,000 more of these notes. The issue is secured on $1,000,000 first mortgage bonds; $2,040,000 first general mortgage bonds, and $1,200,000 10-year 5 per cent. equipment trust notes.

NORTH AMERICAN COMPANY.—This company, through a subsidiary, has bought the Laclede Power Company and the Edison Electric & Illuminating Company, both of St. Louis, Mo. The North American Company now controls all the light, power and street railway companies of St. Louis.

NORTHERN PACIFIC.—With an increase of 11 miles operated, freight earnings on the Northern Pacific (main system) decreased 1.3 per cent. in the month of October, as compared with October, 1906. Mail and express earnings decreased 15.8 per cent. Passenger earnings increased 15.9 per cent., and gross earnings, 2.2 per cent.

PENNSYLVANIA.—See Pennsylvania Company.

PENNSYLVANIA COMPANY.—A semi-annual dividend of 4 per cent. on the $60,000,000 stock has been declared, payable December 31, making 7 per cent. for the year. In 1906, 6 per cent. was paid, and in 1905 and 1904, 5 per cent. The company controls the Pennsylvania Lines West of Pittsburgh and operates the Northwest System. All its stock is owned by the Pennsylvania Railroad.

ST. LOUIS, ROCKY MOUNTAIN & PACIFIC.—The semi-annual interest on the $7,000,000 5 per cent. first mortgage bonds of 1955, which is due on January 2, will be paid on and after December 20.

SOUTHERN PACIFIC.—In October the gross revenue of the Southern Pacific Company was $1,200,000 larger than in the corresponding month a year ago. Operating expenses and taxes increased $2,600,000, so that there was a decrease in net revenue of $1,400,000. In the four months ended October 31, gross revenue was $7,000,000 larger, and net $2,200,000 smaller than in the same period in 1906.